July 2001

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

	Secondary	PSAV
Grade Level	9-12, 30, 31	30, 31
Facility Code	246	246
CTSO:	SkillsUSA-VICA	SkillsUSA-VICA
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. **POROGRAM 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 and safe, efficient work practices account for 420 hours in the CORE curriculum.

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 (150) [135] OCP - A
8709420 - Automotive Service Technology 2 (150)
8709430 - Automotive Service Technology 3 (150) [285] OCP - B
8709440 - Automotive Service Technology 4 (150) [135] OCP - C
8709450 - Automotive Service Technology 5 (150) [185] OCP - D
8709460 - Automotive Service Technology 6 (150) [135] OCP - E
8709470 - Automotive Service Technology 7 (150) [135] OCP - F
8709480 - Automotive Service Technology 8 (150) [135] OCP - G
8709490 - Automotive Service Technology 9 (150)
8709491 - Automotive Service Technology 10 (150) [235] OCP - H
8709492 - Automotive Service Technology 11 (150) [135] OCP - I
8709493 - Automotive Service Technology 12 (150) [285] 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:** Skills USA is the appropriate vocational student organization for providing leadership training and for reinforcing specific vocational skills. Vocational 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

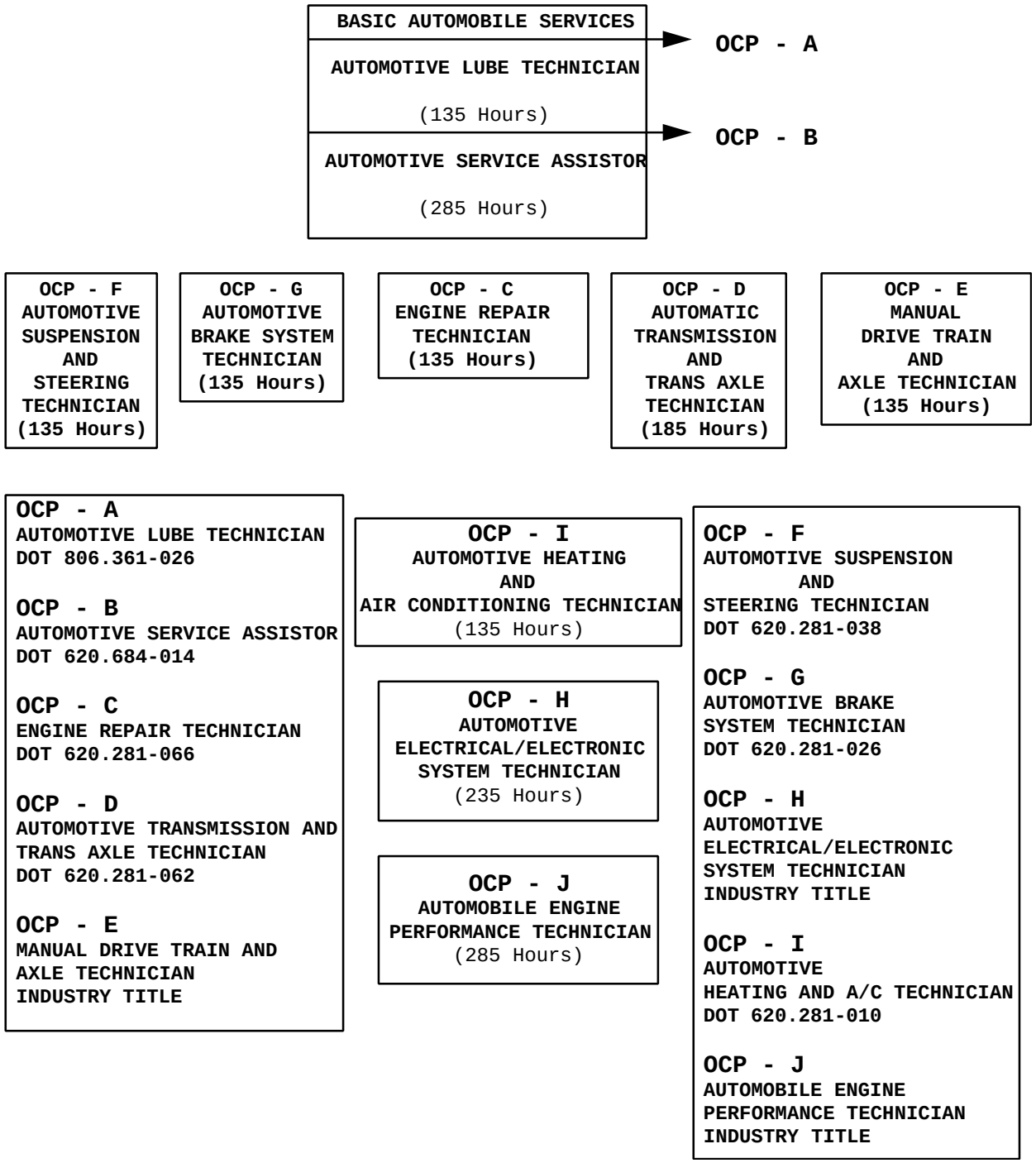
earned when outcomes and standards are mastered in accordance with the requirements indicated in subsequent IEPs. The job title for which the student is being trained must be designated in the IEP.

To be transferable statewide between institutions, these programs/courses 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.

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.

The following diagram illustrates the cluster structure:

AUTOMOTIVE SERVICE TECHNOLOGY



Florida Department of Education
INTENDED OUTCOMES

	Secondary	PSAV
Program Numbers	**8709400**	**I470608**
CIP Number	0647.060405	0647.060405
Grade Level	9-12, 30, 31	30, 31
Length	12 Credits	1800 Hours
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:

OCCUPATIONAL COMPLETION POINT - DATA CODE - A (135 Hours)
AUTOMOTIVE LUBE TECHNICIAN - DOT 806.361-026

01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry. (01.01 - 01.16)
02.0 Demonstrate proficiency in appropriate math skills. (02.01 - 02.13)
03.0 Demonstrate proficiency in appropriate understanding of basic sciences. (03.01 - 03.04)
04.0 Demonstrate proficiency in employability skills. (04.01 - 04.10)
05.0 Demonstrate proficiency in appropriate communication skills. (05.01 - 05.04)
06.0 Demonstrate proficiency in understanding of entrepreneurship. (06.01 - 06.07)
07.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry. (07.01 - 07.08)
08.0 Demonstrate proficiency in routine maintenance and consumer services. (08.01 - 08.27)

OCCUPATIONAL COMPLETION POINT - DATA CODE - B (285 Hours)
AUTOMOTIVE SERVICES ASSISTOR - DOT 620.684-014

08.0 Demonstrate proficiency in routine maintenance and consumer services. (08.28 - 08.58)

OCCUPATIONAL COMPLETION POINT - DATA CODE - C (135 Hours)
ENGINE REPAIR TECHNICIAN - DOT 620.281-066

09.0 Demonstrate proficiency in engine theory and repairs. (09.01 - 09.61)

OCCUPATIONAL COMPLETION POINT - DATA CODE - D (185 Hours)
AUTOMATIC TRANSMISSION AND TRANS-AXLE TECHNICIAN - DOT 620.281-062

10.0 Demonstrate proficiency in the operation and servicing of automatic transmission/trans-axle. (10.01 - 10.43)

OCCUPATIONAL COMPLETION POINT - DATA CODE - E (135 Hours)
MANUAL DRIVE TRAIN AND AXLES TECHNICIAN - INDUSTRY TITLE

11.0 Demonstrate proficiency in the operation and servicing of manual and drive trains and axles. (11.01 - 11.76)

OCCUPATIONAL COMPLETION POINT - DATA CODE - F (135 Hours)
AUTOMOBILE SUSPENSION AND STEERING TECHNICIAN - DOT 620.281-038

12.0 Demonstrate proficiency in the operation of steering, suspension and wheel systems. (12.01 - 12.62)

OCCUPATIONAL COMPLETION POINT - DATA CODE - G (135 Hours)
AUTOMOTIVE BRAKE SYSTEM TECHNICIAN - DOT 620.281-026

13.0 Demonstrate proficiency in the operation and servicing of automotive brake systems. (13.01 - 13.52)

OCCUPATIONAL COMPLETION POINT - DATA CODE - H (235 Hours)
AUTOMOTIVE ELECTRICAL/ELECTRONIC SYSTEM TECHNICIAN - INDUSTRY TITLE

14.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components as related to power train. (14.01 - 14.47)

OCCUPATIONAL COMPLETION POINT - DATA CODE - I (135 Hours)
AUTOMOTIVE HEATING AND AIR-CONDITIONING TECHNICIAN - DOT 620.281-010

15.0 Demonstrate proficiency in heating, air conditioning and engine cooling systems. (15.01 - 15.40)

OCCUPATIONAL COMPLETION POINT - DATA CODE - J (285 Hours)
AUTOMOTIVE ENGINE PERFORMANCE TECHNICIAN - INDUSTRY TITLE

16.0 Demonstrate proficiency in engine performance service. (16.01 - 16.70)

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.
01.02 Identify and use appropriate emergency first aid procedures.
01.03 Identify, use and maintain hand and power tools properly.
01.04 Identify and practice using appropriate precision measuring tools and torque methods.
01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, to include thread repair.
01.06 Identify and use metric and English measurement skills.
01.07 Use computer and operate keyboard.
01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
01.09 Identify and describe typical automotive lubricants and lubricant properties.
01.10 Interpret the Florida 'Workers Right To Know Law'.
01.11 Identify and describe typical automotive seals and gaskets.
01.12 Identify and use the proper procedures required for cutting tubing and double and ISO flaring.
01.13 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
01.14 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.
01.15 Describe and identify supplemental restraint systems (SRS).
01.16 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.

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

02.01 Read and interpret measuring devices (rules and tapes).
02.02 Solve number word problems.
02.03 Write percents add fractions and decimals.
02.04 Solve percent problems.
02.05 Find the percent of a number.
02.06 Operate a calculator.
02.07 Understand and use the metric system.
02.08 Convert inches to millimeters and millimeters to inches.
02.09 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
02.10 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
02.11 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.

02.12 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
02.13 Understand and interpret gears and gear ratios.

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

03.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
03.02 Draw conclusions or make inferences from data.
03.03 Identify health-related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
03.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

04.0 DEMONSTRATE PROFICIENCY IN EMPLOYABILITY SKILLS--The student will be able to:

04.01 Identify employment requirements for an automotive career.
04.02 Identify documents which may be required when applying for a job.
04.03 Complete a job application form correctly.
04.04 Identify and adopt acceptable work habits.
04.05 Demonstrate acceptable employee health habits; including infection control of blood born pathogens.
04.06 Demonstrate appropriate telephone/communication skills.
04.07 Conduct a job search.
04.08 Demonstrate competence in job interview techniques.
04.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
04.10 Demonstrate knowledge of how to make job changes appropriately.

05.0 DEMONSTRATE PROFICIENCY IN APPROPRIATE COMMUNICATION SKILLS--The student will be able to:

05.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
05.02 Read and follow written and oral instructions.
05.03 Answer and ask questions coherently and concisely.
05.04 Read critically by recognizing assumptions and implications and by evaluating ideas.

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

06.01 Define entrepreneurship.
06.02 Describe the importance of entrepreneurship to the American economy.
06.03 List the advantages and disadvantages of business ownership.
06.04 Identify the risks involved in ownership of business.
06.05 Identify the necessary personal characteristics of a successful entrepreneur.
06.06 Identify the business skills needed to operate a small business efficiently and effectively.
06.07 Identify and apply communication skills used in automotive careers.

07.0 DEMONSTRATE PROFICIENCY IN ACCEPTABLE EMPLOYEE BEHAVIOR IN THE AUTOMOTIVE INDUSTRY--The student will be able to:

07.01 Explain the effects of chemical/substance abuse.
07.02 Identify principles of stress management.
07.03 Identify and define career opportunities in the automotive service industry.
07.04 Demonstrate acceptable industry dress code.
07.05 Identify and demonstrate proper customer relation skills.
07.06 Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems.
07.07 Identify principles of time management.
07.08 Identify acceptable customer relations.

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

08.01 Inspect, test headlamps, tail lamps and stop lamps. Aim headlights.
08.02 Perform oil and filter change.
08.03 Service transmission; perform visual inspection; replace fluids and filters.
08.04 Inspect engine assembly for fuel, oil, coolant, and other leaks.
08.05 Inspect manual and power steering fluid levels and condition.
08.06 Check rear axle drive assembly seals and vents; check lube level.
08.07 Inspect and replace power steering hoses and fittings.
08.08 Lubricate suspension and steering systems.
08.09 Inspect, remove, and replace shock absorbers.
08.10 Remove, inspect, and service front and rear wheel bearings on non-drive axles.
08.11 Inspect tires and diagnose tire wear patterns. Check and adjust air pressure.
08.12 Rotate tires according to manufacturer’s recommendations, install wheels, torque lug nuts.
08.13 Balance wheel and tire assembly (static and dynamic).
08.14 Dismount, inspect, repair, and remount tire on wheel.
08.15 Check master cylinder for internal and external leaks and proper operation.
08.16 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
08.17 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
08.18 Select, handle, store, and install brake fluids to proper level.
08.19 Fill master cylinder with recommended fluid and seat pads.
08.20 Inspect, clean, fill, and replace battery.
08.21 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or perform necessary action.
08.22 Start a vehicle using jumper cables using a battery auxiliary power supply.
08.23 Perform slow/fast battery charge.
08.24 Observe dash warning lamps during bulb check.
08.25 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).

08.26 Practice recommended precautions when handling static sensitive devices.
08.27 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or perform necessary action.

OCCUPATIONAL COMPLETION POINT - B
AUTOMOTIVE SERVICES ASSISTOR

08.37 Use wiring diagrams of electrical circuit problems.
08.38 Check electrical circuits with a test light; determine necessary action.
08.39 Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM).
08.40 Check current flow in electrical/electronic circuits and components using an ammeter.
08.41 Check electrical circuits using jumper wires.
08.42 Measure and diagnose the cause(s) of abnormal key-off battery drain.
08.43 Inspect and test fusible links, circuit breakers, and fuses; perform necessary action.
08.44 Perform battery capacity (load, high-rate discharge) test; determine necessary service.
08.45 maintain or restore electronic memory functions.
08.46 Perform starter current draw and circuit voltage drop test; determine necessary action.
08.47 Remove and replace/reinstall starter.
08.48 Perform charging system test.
08.49 Remove, inspect, and replace/reinstall alternator.
08.50 Demonstrate retrieving stored diagnostic trouble codes.
08.51 Obtain and interpret digital multimeter (DMM) readings.
08.52 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.
08.53 Replace fuel filters.
08.54 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or perform necessary action.
08.55 Adjust valves on engines with mechanical lifters.
08.56 Remove and replace valve cover gaskets (ASE).
08.57 Return cores for rebuilt and exchange items.
08.58 Inspect passenger restraint system, repair if needed.

OCCUPATIONAL COMPLETION POINT - C
ENGINE REPAIR TECHNICIAN

09.0 DEMONSTRATE PROFICIENCY IN ENGINE THEORY AND REPAIR--The student will be able to:

09.01 Verify and interpret engine concern; determine necessary action. P-1
09.02 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-2
09.03 Diagnose engine noises and vibrations; determine necessary action. P-3
09.04 Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action. P-3
09.05 Perform engine vacuum tests; determine necessary action. P-1
09.06 Perform cylinder power balance tests; determine necessary action. P-1
09.07 Perform cylinder compression tests; determine necessary action. P-1
09.08 Perform cylinder leakage tests; determine necessary action. P-1

09.09 Remove engine (front-wheel drive); prepare for disassembly. P-3
09.10 Reinstall engine (front-wheel drive). P-3
09.11 Remove engine (rear-wheel drive); prepare for disassembly. P-3
09.12 Reinstall engine (rear-wheel drive). P-3

CYLINDER HEAD AND VALVE TRAIN DIAGNOSIS AND REPAIR

09.13 Remove cylinder head(s); visually inspect cylinder head(s) for Cracks; check gasket surface areas for warpage and leakage; check passage condition. P-2
09.14 Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures. P-2
09.15 Inspect and test valve springs for squareness, pressure, and free height comparison; replace as needed. P-3
09.16 Inspect valve spring retainers, locks, and valve grooves. P-2
09.17 Replace valve stem seals. P-3
09.18 Inspect valve guides for wear; check valve guide height and stem-to-guide clearance; recondition or replace as needed. P-3
09.19 Resurface valves; perform necessary action. P-2
09.20 Resurface valve seats; perform necessary action. P-2
09.21 Check valve face-to-seat contact and valve seat concentricity (run out); service seats and valves as needed. P-3
09.22 Check valve spring assembled height and valve stem height; service valve and spring assemblies as needed. P-2
09.23 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); perform necessary action. P-2
09.24 Inspect hydraulic or mechanical lifters; replace as needed. P-2
09.25 Adjust valves (mechanical or hydraulic lifters). P-1
09.26 Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear;) replace as necessary. P-2
09.27 Inspect and replace timing belt(s), overhead camdrive sprockets and tensioners; check belt tension; adjust as necessary. P-1
09.28 Inspect camshaft for run out; journal wear and lobe wear. P-3
09.29 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine *necessary action*. P-3
09.30 Verify camshaft(s) timing according to manufacturer's specifications and procedure. P-1

ENGINE BLOCK DIAGNOSIS AND REPAIR

09.30 Inspect and replace pans, covers, gaskets, and seals. P-2
09.31 Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action. P-2
09.32 Inspect internal and external threads; restore as needed (includes installing thread inserts). P-1
09.33 Remove cylinder wall ridges. P-3
09.34 Inspect and measure cylinder walls for damage and wear; determine necessary action. P-2
09.35 Deglaze and clean cylinder walls. P-1
09.36 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. P-3
09.37 Inspect crankshaft for surface cracks and journal damage; check oil passage condition; measure journal wear; determine necessary action. P-3
09.38 Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selections of bearings). P-2

09.39 Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition. P-3
09.40 Inspect, measure, and service pistons and pins; determine necessary action. P-2
09.41 Inspect, measure, and install piston rings. P-2
09.42 Inspect, repair or replace crankshaft vibration damper (harmonic balancer). P-3
09.43 Reassemble engine components using correct gaskets and sealants. P-2
09.44 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. P-3
09.45 Prime engine lubrication system. P-1

LUBRICATION AND COOLING SYSTEMS DIAGNOSIS AND REPAIRS

09.46 Perform oil pressure tests; determine necessary action. P-1
09.47 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action. P-3
09.48 Perform cooling system, cap and recovery tests (pressure, combustion leakage, and temperature); determine necessary action. P-1
09.49 Inspect, replace, and adjust drive belts, tensioners and pulleys. P-1
09.50 Inspect and replace engine cooling and heater system hoses. P-2
09.51 Inspect, test, and replace thermostat and housing. P-2
09.52 Test coolant; drain and recover, flush, and refill cooling system with recommended coolant and bleed air as required. P-1
09.53 Inspect, test, remove, and replace water pump. P-2
09.54 Remove and replace radiator. P-2
09.55 Inspect, and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams. P-2
09.56 Inspect auxiliary oil coolers; perform necessary action. P-3
09.57 Inspect, test, and replace oil temperature and pressure switches and sensors. P-2
09.58 Perform oil and filter change. P-1

OCCUPATIONAL COMPLETION POINT - D
AUTOMATIC TRANSMISSION AND TRANSAXLE TECHNICIAN

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

10.01 Identify and interpret transmission concern; assure proper engine operation; determine necessary action. P-1
10.02 Diagnose unusual fluid usage, level, and condition concerns; determine necessary action. P-1
10.03 Perform pressure tests; determine necessary action. P-1
10.04 Perform lock-up converter system tests; determine necessary action. P-2
10.05 Diagnose electronic, mechanical, hydraulic, vacuum control systems concerns; determine necessary action. P-1
10.06 Diagnose noise and vibration concerns; determine necessary action. P-3

TRANSMISSION AND TRANSAXLE MAINTENANCE AND ADJUSTMENT

10.07 Inspect, adjust or replace throttle (TV)linkages or cables and check gear select indicator(as applicable). P-1

10.08 Service transmission; perform visual inspection; replace fluids and filters. P-1

IN-VEHICLE TRANSMISSION AND TRANSAXLE REPAIR

10.09 Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses. P-3
10.10 Inspect, repair, and replace governor assembly. P-3
10.11 Inspect and replace external seals and gaskets. P-2
10.12 Inspect extension housing; bushings and seals; perform necessary action. P-3
10.13 Inspect, leak test, flush, and replace cooler, lines, and fittings. P-1
10.14 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. P-3
10.15 Inspect, and test, adjust, repair or replace transmission related electrical and electronic components (includes computers, solenoids, sensors, relays, switches, and harnesses). P-1
10.16 Inspect, replace, and align powertrain mounts. P-3

OFF-VEHICLE TRANSMISSION AND TRANSAXLE REPAIR (REMOVAL, DISASSEMBLY, AND REINSTALLATION)

10.17 Remove and reinstall transmission and torque converter (rear-wheel drive). P-2
10.18 Remove and reinstall transaxle and torque converter assembly. P-2
10.19 Disassemble, clean, and inspect transmission/trans-axle. P-1
10.20 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. P-2
10.21 Inspect servo bore, piston, seals, pin, spring, and retainers; determine necessary action. P-3
10.22 Inspect accumulator bore, piston, seals, spring, and retainers; determine necessary action. P-3
10.23 Assemble transmission/trans-axle. P-1

OIL PUMP AND CONVERTER

10.24 Inspect converter flex plate, attaching parts, pilot, pump drive, and seal areas. P-2
10.25 Measure torque converter end play and check for interference; check stator clutch. P-2
10.26Inspect, measure, and replace oil pump assembly and components. P-3
10.27 Check torque converter and transmission cooling system for contamination. P-1

GEAR TRAIN, SHAFTS, BUSHINGS AND CASE

10.28 Measure end play or preload; determine necessary action. P-1
10.29 Inspect, measure, and replace thrust washers and bearings. P-2
10.30 Inspect oil delivery seal rings, ring grooves, and sealing surface areas. P-2
10.31 Inspect bushings; replace as needed. P-2
10.32 Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); replace as needed. P-2
10.33 Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. P-2
10.34 Inspect transaxle drive, link chains, sprockets, gears, bearings,

and bushings; perform necessary action. P-2
10.35 Inspect, measure, repair, adjust or replace transaxle final drive components. P-2
10.36 Inspect and reinstall parking pawl, shaft, spring, and retainer; determine necessary action. P-3

FRICTION AND REACTION UNITS

10.37 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; replace as needed. P-2
10.38 Measure clutch pack clearance; adjust as needed. P-1
10.39 Air test operation of clutch and servo assemblies. P-1
10.40 Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed. P-2
10.41 Inspect bands and drums; adjust or replace as needed. P-3

OCCUPATIONAL COMPLETION POINT - E
MANUAL DRIVETRAIN AND AXLE TECHNICIAN

11.0 DEMONSTRATE PROFICIENCY IN THE OPERATION AND ASSEMBLY OF MANUAL DRIVE TRANSMISSION/TRANSAXLE--The student will be able to:

11.01 Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action. P-1
11.02 Inspect, clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. P-1
11.03 Inspect, hydraulic clutch slave and master-cylinders, lines and hoses; perform necessary action. P-1
11.04 Inspect, release (throw-out) bearing, lever, and pivot; perform necessary action. P-1
11.05 Inspect and replace clutch pressure plate assembly and clutch disc. P-1
11.06 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable). P-1
11.07 Inspect, flywheel and ring gear for wear and cracks, measure run out; determine necessary action. P-1
11.08 Inspect engine block, clutch (bell) housing, and transmission/transaxle case mating surface; determine necessary action. P-3
11.09 Measure flywheel-to-block run out and crankshaft end play; determine necessary action. P-3

TRANSMISSION & TRANSAXLE DIAGNOSIS AND REPAIR

11.10 Remove and reinstall transmission/transaxle. P-2
11.11 Disassemble, clean, and reassemble transmission/transaxle components. P-2
11.12 Inspect transmission/transaxle case, extension housing, case mating Surfaces, bores, bushings, and vents; perform necessary action. P-3
11.13 Diagnose noise, hard shifting, jumping out of gear, and fluid leakage problems; determine necessary action. P-3
11.14 Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers. P-3
11.15 Inspect and reinstall power train mounts. P-3
11.16 Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. P-2
11.17 Remove and replace transaxle final drive. P-3
11.18 Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanisms, interlocks,

and springs. P-2

11.19 Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. P-1

11.20 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. P-2

11.21 Inspect and reinstall speedometer drive gear, driven gear, vehicle Speed sensor (VSS), and retainers. P-2

11.22 Diagnose transaxle final drive assembly noise and vibration concerns; Determine necessary action. P-3

11.23 Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly. P-2

11.24 Inspect lubrication devices (oil pump or slingers); perform necessary action. P-3

11.25 Inspect, test, and replace transmission/transaxle sensors and switches. P-1

DRIVE AND HALF SHAFT UNIVERSAL AND CONSTANT-VELOCITY (CV) JOINT DIAGNOSIS AND REPAIR

11.26 Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action. P-2

11.27 Diagnose universal joint noise and vibration concerns; perform necessary action. P-2

11.28 Replace front wheel drive (FWD) front wheel bearing. P-2

11.29 Inspect, service, and replace shafts, yokes, boots, and CV joints. P-1

11.30 Inspect, service, and replace shaft center support bearings. P-3

11.31 Check shaft balance; measure shaft run out; measure and adjust driveline angles. P-3

REAR AXLE DIAGNOSIS AND REPAIR; RING AND PINION GEARS AND DIFFERENTIAL CASE ASSEMBLY

11.32 Diagnose noise and vibration concerns; determine necessary action. P-2

11.33 Diagnose fluid leakage concerns; determine necessary action. P-2

11.34 Inspect and replace companion flange and pinion seal; measure companion flange run out. P-2

11.35 Inspect ring gear and measure run out; determine necessary action. P-2

11.36 Remove, inspect, and reinstall drive pinion and ring, gear, spacers, Sleeves, and bearings. P-2

11.37 Measure and adjust drive pinion depth. P-2

11.38 Measure and adjust drive pinion bearing preload. P-1

11.39 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). P-2

11.40 Check ring and pinion tooth contact patterns; perform necessary action. P-1

11.41 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2

11.42 Reassemble and reinstall differential case assembly; measure run out; determine necessary action. P-2

LIMITED SLIP DIFFERENTIAL

11.43 Diagnose noise, slippage, and chatter concerns; determine necessary action. P-3

11.44 Inspect and flush differential housing; refill with correct lubricant. P-2
11.45 Inspect and reinstall clutch (cone or plate) components. P-3
11.46 Measure rotating torque; determine necessary action. P-3

DRIVE AXLE SHAFT

11.47 Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. P-2
11.48 Inspect and replace rear axle shaft wheel studs. P-3
11.49 Remove and replace drive axle shafts. P-1
11.50 Inspect and replace drive axle shaft seals, bearings, and retainers. P-2
11.51 Measure drive axle flange run out and shaft end play; determine necessary action. P-2

FOUR-WHEEL DRIVE/ALL-WHEEL DRIVE COMPONENT DIAGNOSIS AND REPAIR

11.52 Diagnose noise, vibration, and unusual steering concerns; determine necessary action. P-3
11.53 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. P-3
11.54 Remove and reinstall transfer case. P-3
11.55 Disassemble, service, and reassemble transfer case and components. P-3
11.56 Inspect, front-wheel bearings and locking hubs; perform necessary action. P-3
11.57 Check drive assembly seals and vents; check lube level. P-3
11.58 Diagnose, test, adjust and replace electrical/electronic components of four-wheel drive systems. P-3

OCCUPATIONAL COMPLETION POINT - F
AUTOMOTIVE SUSPENSION AND STEERING TECHNICIAN

12.0 DEMONSTRATE PROFICIENCY IN THE OPERATION OF STEERING, SUSPENSION AND WHEEL SYSTEMS--The student will be able to:

12.01 Disable and enable supplemental restraint system (SRS) in accordance with manufacturer’s procedures. P-1
12.02 Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil in accordance with manufacturer's procedures. P-1
12.03 Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action P-3
12.04 Diagnose power steering (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. P-3
12.05 Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering and fluid leakage concerns; determine necessary action. P-3
12.06 Inspect steering shaft universal-joint(s), flexible coupling (s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. P-2
12.07 Adjust manual or power non-rack and pinion worm bearing preload and sector lash. P-3
12.08 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets. P-2
12.09 Disassemble , inspect, perform necessary action and reassemble rack and pinion steering gear. P-3
12.10 Adjust manual or power rack and pinion steering gear. P-3
12.11 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. P-2
12.12 Inspect power steering fluid levels and condition. P-1
12.13 Flush, fill, and bleed power steering system. P-2

12.14 Diagnose power steering fluid leakage; determine necessary action. P-2
12.15 Remove, inspect, replace, and adjust power steering pump belt. P-1
12.16 Remove, inspect, and replace power steering pump, mounts, seals, and gaskets. P-3
12.17 Remove, inspect, and replace power steering pump pulley; check alignment. P-3
12.18 Inspect and replace power steering hoses and fittings. P-2
12.19 Inspect and replace power steering hoses and fittings. P-2
12.20 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. P-3
12.21 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. P-2
12.22 Diagnose and adjust, components of electronically-controlled steering systems; determine necessary action. P-3

SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR; FRONT SUSPENSIONS

12.23 Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action. P-1
12.24 Diagnose MacPherson strut suspension system noises body sway, and uneven riding height concerns; determine necessary action. P-1
12.25 Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. P-2
12.26 Remove, inspect, install, and adjust strut (compression/tension) rods and bushings. P-2
12.27 Remove, inspect, and install upper and lower ball joints on short and long arm suspension systems. P-2
12.28 Remove, inspect, and install steering knuckle assemblies. P-2
12.29 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. P-2
12.30 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. P-3
12.31 Remove, inspect and install stabilizer bar bushings, bracket and links. P-3
12.32 Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, (silencers) insulators, and upper strut bearing mount. P-1
12.33 Lubricate suspension and steering systems. P-2

REAR SUSPENSIONS

12.34 Remove, inspect, and install coil springs and spring insulators. P-2
12.35 Remove, inspect, and install transverse links, control arms, bushings, and mounts. P-2
12.36 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. P-3
12.37 Remove, inspect, and install MacPherson strut cartridge or assembly, strut coil spring, and insulators (silencers). P-2

MISCELLANEOUS SERVICE

12.38 Inspect, remove, and replace shock absorbers. P-1
12.39 Remove, inspect, and service or replace front and rear wheel bearings. P-1
12.40 Diagnose, inspect, adjust, repair or replace components of electronically-controlled suspension systems. P-2

WHEEL ALIGNMENT DIAGNOSIS, ADJUSTMENT, AND REPAIR

12.41 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.
12.42 Perform pre-alignment inspection; perform necessary action. P-1
12.43 Measure vehicle riding height; determine necessary action. P-1
12.44 Check and adjust front and rear wheel camber; perform necessary action. P-1
12.45 Check and adjust caster; perform necessary action. P-1
12.46 Check and adjust front wheel toe; adjust as needed.
12.47 Center steering wheel. P-1
12.48 Check toe-out-on-turns (turning radius); determine necessary action. P-2
12.49 Check SAI (steering axis inclination) and included angle; determine necessary action. P-2
12.50 Check and adjust rear wheel toe. P-2
12.51 Check rear wheel thrust angle; determine necessary action. P-2
12.52 Check for front wheel setback; determine necessary action. P-2
12.53 Check front cradle (subframe) alignment; determine necessary action. P-3

WHEEL AND TIRE DIAGNOSIS AND REPAIR

12.54 Diagnose tire wear patterns; determine necessary action. P-1
12.55 Inspect tires; check and adjust air pressure. P-1
12.56 Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. P-2
12.57 Rotate tires according to manufacturer’s recommendations. P-1
12.58 Measure wheel, tire, axle, and hub run out; determine necessary action. P-2
12.59 Diagnose tire pull (lead) problem; determine necessary action. P-2
12.60 Balance wheel and tire assembly (static and dynamic). P-1
12.61 Dismount, inspect, repair, and remount tire on wheel. P-2
12.62 Reinstall wheel; torque lug nuts. P-1

OCCUPATIONAL COMPLETION POINT - G
AUTOMOTIVE BRAKE TECHNICIAN

13.0 DEMONSTRATE PROFICIENCY IN THE OPERATION AND SERVICING OF AUTOMOTIVE BRAKE SYSTEM--The student will be able to:

13.01 Measure and adjust pedal height. P-2
13.02 Check master cylinder for internal and external leaks and proper operation; determine necessary action. P-2
13.03 Remove, bench bleed, and reinstall master cylinder. P-1
13.04 Diagnose poor stopping, pulling or dragging concerns caused by problems in the hydraulic system; determine necessary action. P-1
13.05 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. P-2
13.06 Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed. P-2
13.07 Select, handle, store, and install brake fluids to proper level. P-1
13.08 Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. P-3
13.09 Inspect, test, replace, and adjust height (load) sensing proportioning valve. P-3
13.10 Inspect, test, and replace components of brake warning light

	system.	P-3
13.11	Bleed (manual, pressure, vacuum or surge) brake system.	P-1
13.12	Flush hydraulic system.	P-3

DRUM BRAKE DIAGNOSIS AND REPAIR

13.13 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1
13.14 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or perform necessary action. P-1
13.15 Mount brake drum on lathe machine braking surface. P-2
13.16 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. P-2
13.17 Remove and inspect wheel cylinders. P-2
13.18 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings. P-1
13.19 Install wheel, torque lug nuts, and make final checks and adjustments. P-1

DISC BRAKE DIAGNOSIS AND REPAIR

13.20 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1
13.21 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action. P-1
13.22 Clean and inspect caliper mounting and slides for wear and damage; determine necessary action. P-1
13.23 Remove, clean, and inspect pads and retaining hardware; determine necessary action. P-1
13.24 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. P-1
13.25 Reassemble, lubricate, and reinstall caliper, pads, and related hardware, seat pads, and inspect for leaks. P-1
13.26 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer’s recommendations in determining need to machine or replace. P-1
13.27 Refinish rotor according to manufacturer’s recommendations. P-1
13.28 Adjust calipers with integrated parking brake system. P-3
13.29 Install wheel, torque lug nuts, and make final checks and adjustments. P-1
13.30 Remove and replace rotor. P-2

POWER ASSIST UNITS DIAGNOSIS AND REPAIR

13.31 Test pedal free travel with and without engine running; check power assist operation. P-2
13.32 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. P-2
13.33 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action. P-3
13.34 Inspect and test hydro-boost system and accumulator for leaks and proper operation; necessary action. P-3

MISCELLANEOUS (WHEEL BEARINGS, PARKING BRAKES, ELECTRICAL, ETC.) DIAGNOSIS AND REPAIR

13.35 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. P-1
13.36 Remove, clean, inspect, repack, and install wheel bearings and

replace seals; install hub and adjust wheel bearings. P-1
13.37 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed. P-2
13.38 Check parking brake operation; adjust as needed. P-1
13.39 Check operation of parking brake indicator light system. P-3
13.40 Check operation of brake stop light system; adjust and service as needed. P-1
13.41 Replace wheel bearing and race. P-1

ANTI-LOCK BRAKE SYSTEM

13.42 Inspect, and test anti-lock brake system (ABS)components; determine necessary action. P-2
13.43 Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise concerns caused by the anti-lock brake system (ABS); determine necessary action. P-2
13.44 Diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action. P-1
13.45 Depressurize high pressure components of the anti-lock brake system (ABS) following manufacturer's recommended safety procedures. P-2
13.46 Bleed the anti-lock brake system’s (ABS) front and rear hydraulic circuits following manufacturer's procedures. P-2
13.47 Remove and install anti-lock brake system (ABS) electrical/electronic/ hydraulic components following manufacturer's procedures and specifications. P-3
13.48 Service, test, and adjust anti-lock brake system (ABS) speed sensors following manufacturer's recommended procedures. P-2
13.49 Diagnose anti-lock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc. P-3

OCCUPATIONAL COMPLETION POINT - H
AUTOMOTIVE ELECTRICAL/ELECTRONIC SYSTEM TECHNICIAN

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

14.01 Use wiring diagrams during diagnosis of electrical circuit problems. P-1
14.02 Check electrical circuits with a test light; determine necessary action. P-2
14.03 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine necessary action. P-1
14.04 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action. P-1
14.05 Check continuity and resistance(s) in electrical/electronic circuits And components with an ohmmeter; determine necessary action. P-1
14.06 Check electrical circuits using jumper wires; determine necessary action. P-2
14.07 Locate shorts, grounds, opens, and resistance problems in electrical/ electronic circuits; determine necessary action. P-1
14.08 Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action. P-1
14.09 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. P-1
14.10 Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; repair or perform necessary action. P-1
14.11 Repair wiring harnesses and connectors. P-1
14.12 Perform solder repair of electrical wiring. P-1

BATTERY DIAGNOSIS AND SERVICE

14.10 Perform battery state-of-charge test; determine needed service. P-1
14.11 Perform battery capacity test; determine needed service P-1
14.12 Maintain or restore electronic memory functions. P-2
14.13 Inspect, clean, fill, and replace battery. P-2
14.14 Perform slow/fast battery charge. P-2
14.15 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed. P-1
14.16 Start a vehicle using jumper cables and a battery or auxiliary power supply according to manufacturers' recommended specifications. P-1

STARTING SYSTEM DIAGNOSIS AND REPAIR

14.17 Perform starter current draw tests. Determine necessary action. P-1
14.18 Perform starter circuit voltage drop tests; determine necessary action. P-1
14.19 Inspect and test starter relays and solenoids; replace as needed. P-2
14.20 Remove and install starter. P-2
14.21 Perform starter bench tests; determine necessary action. P-3
14.22 Inspect, and test switches, connectors, and wires of starter control circuits; perform necessary action. P-2
14.23 Disassemble, clean, inspect, and test starter components; replace as needed. P-3

CHARGING SYSTEM DIAGNOSIS AND REPAIR

14.24 Perform charging system output test; determine necessary action. P-1
14.25 Diagnose charging system for the cause of undercharge, no charge, and overcharge conditions. P-1
14.26 Inspect and adjust generator (alternator) drive belts; replace as needed. P-1
14.27 Inspect and test voltage regulator/regulating circuit; perform necessary action. P-2
14.28 Remove, inspect, and install generator (alternator). P-2
14.29 Disassemble, generator (alternator), clean, inspect, and test components; determine necessary action. P-3
14.30 Perform charging circuit voltage drop tests; determine necessary action. P-1

LIGHTING SYSTEMS DIAGNOSIS AND REPAIR

14.31 Diagnose the cause of brighter than normal, intermittent, dim or no light operation; determine necessary action. P-2
14.32 Inspect, replace, and aim headlights and bulbs. P-2
14.33 Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. P-2

GAUGES, WARNING DEVICES, AND DRIVER INFORMATION SYSTEMS DIAGNOSIS AND REPAIR

14.34 Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action. P-2
14.35 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or determine necessary action. P-3
14.36 Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. P-1

14.37 Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; determine necessary action. P-3

HORN AND WIPER/WASHER DIAGNOSIS AND REPAIR

14.38 Diagnose incorrect horn operation; perform necessary action. P-3
14.39 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. P-3
14.40 Diagnose incorrect windshield washer operation; perform necessary action. P-3

ACCESSORIES DIAGNOSIS AND REPAIR

14.41 Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. P-2
14.42 Diagnose incorrect heated glass operation; determine necessary action. P-3
14.43 Diagnose incorrect electric lock operation; determine necessary action. P-3
14.44 Diagnose incorrect operation of cruise control systems; repair as needed. P-3
14.45 Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (NOTE: Follow manufacturer's safety procedures to prevent accidental deployment.) P-2
14.46 Diagnose radio static and weak, intermittent, or no radio reception, determine necessary action. P-3

OCCUPATIONAL COMPLETION POINT - I
AUTOMOTIVE HEATING AND AIR-CONDITIONING TECHNICIAN

15.0 DEMONSTRATE PROFICIENCY IN HEATING, AIR CONDITIONING AND ENGINE COOLING SYSTEMS--The student will be able to:

15.01 Diagnose unusual operating noises in the A/C system; determine necessary action. P-2
15.02 Identify refrigerant type; conduct a performance test of the A/C System; determine necessary action. P-1
15.03 Leak test A/C system; determine necessary action. P-1
15.04 Inspect the condition of discharged oil; determine necessary action. P-2
15.05 Select oil type; measure and add oil to the A/C system as needed. P-2

REFRIGERATION SYSTEM COMPONENT DIAGNOSIS AND REPAIR
COMPRESSOR AND CLUTCH

15.06 Diagnose A/C system problems that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. P-2
15.07 Inspect A/C compressor drive belts; replace and adjust as needed. P-2
15.08 Inspect, test, and replace A/C compressor clutch components or assembly. P-2
15.09 Remove and replace A/C compressor and mountings. P-2

EVAPORATOR, RECEIVER/DRIER, CONDENSER, ETC.

15.10 Determine need for A/C system filter; perform necessary action. P-3
15.11 Remove and inspect A/C system mufflers, hoses, lines, fittings,

o-rings, seals, and service valves; perform necessary action. P-2
15.12 Inspect A/C condenser for air flow restrictions; perform necessary action. P-1
15.13 Remove and install receiver/drier or accumulator/drier. P-2
15.14 Remove and install expansion valve or orifice (expansion) tube. P-2
15.15 Inspect evaporator housing water drain; perform necessary action. P-3

HEATING AND ENGINE COOLING SYSTEMS DIAGNOSIS AND REPAIR

15.16 Diagnose temperature control problems in the heater/ventilation system; determine necessary action. P-2
15.17 Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action. P-1
15.18 Inspect engine cooling and heater system hoses and belts; perform necessary action. P-1
15.19 Inspect, test, and replace thermostat and housing. P-1
15.20 Determine coolant condition; drain and recover coolant. P-1
15.21 Flush system; refill with recommended coolant; bleed system. P-1
15.22 Inspect, and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; perform necessary action. P-1
15.23 Inspect and test electrical fan control system and circuits. P-1
15.24 Inspect and test heater control valve(s); perform necessary action. P-2

OPERATING SYSTEMS AND RELATED CONTROLS DIAGNOSIS AND REPAIRS

15.25 Diagnose failures in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action. P-2
15.26 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action. P-2
15.27 Test A/C compressor load cut-off systems; determine necessary action. P-3

VACUUM/MECHANICAL

15.28 Diagnose failures in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. P-2
15.29 Inspect and test A/C-heater control panel assembly; determine necessary action. P-3
15.30 Inspect and test A/C-heater control cables and linkages; perform necessary action. P-3
15.31 Inspect and test A/C-heater ducts, doors, hoses, and outlets; perform necessary action. P-3

AUTOMATIC AND SEMI-AUTOMATIC TEMPERATURE CONTROLS

15.32 Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action. P-3

REFRIGERANT RECOVERY, RECYCLING, AND HANDLING

15.33 Verify correct operation and maintenance of refrigerant handling equipment. P-1

15.34 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant. P-1
15.35 Recycle refrigerant. P-1

15.36 Label and store refrigerant. P-1
15.37 Test recycled refrigerant for non-condensable gases. P-1
15.38 Evaluate and charge A/C system. P-1

OCCUPATIONAL COMPLETION POINT - J
AUTOMOTIVE ENGINE PERFORMANCE TECHNICIAN.-.INDUSTRY TITLE

16.0 DEMONSTRATE PROFICIENCY IN ENGINE PERFORMANCE SERVICES--The student will be able to:

16.01 Interpret and verify concern; determine necessary action. P-1
16.02 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-2
16.03 Diagnose unusual engine noise or vibration concerns; determine necessary action. P-2
16.04 Diagnose unusual exhaust color, odor, and sound; determine necessary action. P-2
16.05 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. P-1
16.06 Perform cylinder power balance test; determine necessary action. P-1
16.07 Perform cylinder compression test; determine necessary action. P-1
16.08 Perform cylinder leakage test; determine necessary action. P-1
16.09 Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and engine diagnostic equipment; determine necessary action. P-1
16.10 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret readings and determine necessary action. P-1

COMPUTERIZED ENGINE CONTROLS DIAGNOSIS AND REPAIR

16.11 Retrieve and record stored OBDII diagnostic trouble codes; clear codes. P-1
16.12 Diagnose the causes of emissions or derivability concerns resulting from failure of computerized engine controls with stored diagnostic trouble codes. P-1
16.13 Diagnose emissions or derivability concerns resulting from failure of computerized engine controls with no stored diagnostic trouble codes determine necessary action. P-1
16.14 Inspect, and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits; perform necessary action. P-2
16.15 Obtain and interpret digital multimeter (DMM) readings. P-1
16.16 Access and use electronic service information (ESI). P-3
16.17 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals). P-1
16.18 Inspect and test power and ground circuits and connections; service or replace as needed. P-1
16.19 Practice recommended precautions when handling static sensitive devices. P-2
16.20 Diagnose derivability and emissions problems resulting from failures of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, and similar systems); determine necessary action. P-2

IGNITION SYSTEM DIAGNOSIS AND REPAIR

16.21 Diagnose no-starting, derivability, and emissions concerns on vehicles

with electronic ignition (EI/DIS)(distributorless) systems; determine necessary action. P-1

16.22 Diagnose no-starting, derivability, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action. P-1

16.23 Inspect and test ignition primary circuit wiring and components; perform necessary action. P-2

16.24 Inspect and test distributor; perform necessary action. P-3

16.25 Inspect and test ignition system secondary circuit wiring and components; perform necessary action. P-2

16.26 Inspect and test ignition coil(s); perform necessary action. P-2

16.27 Check and adjust (where applicable) ignition system timing and timing advance/retard. P-1

16.29 Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action. P-2

16.30 Inspect and test ignition control module; perform necessary action. P-2

FUEL, AIR INDUCTION, AND EXHAUST SYSTEMS DIAGNOSIS AND REPAIR

16.31 Diagnose hot or cold no-starting, hard starting, poor derivability, 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. P-3

16.32 Diagnose hot or cold no-starting, hard starting, poor derivability, 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. P-1

16.33 Inspect fuel tank and fuel cap, fuel lines, fittings, and hoses; perform necessary action. P-2

16.34 Check fuel for contaminants and quality; determine necessary action. P-2

16.35 Inspect and test mechanical and electrical fuel pumps and pump control systems; perform necessary action. P-2

16.36 Replace fuel filters. P-1

16.37 Inspect and test fuel pressure regulation system and components of injection-type fuel systems; perform necessary action. P-1

16.38 Inspect and test cold enrichment system and components; perform necessary action. P-3

16.39 Remove, service, and install throttle body; adjust related linkages. P-2

16.40 Inspect, test and clean fuel injectors . P-2

16.41 Inspect throttle body mounting plates, air induction and filtration system, intake manifold, and gaskets; perform necessary action. P-2

16.42 Check idle speed and fuel mixture. P-2

16.43 Adjust idle speed and fuel mixture. P-3

16.44 Remove, inspect, and test vacuum and electrical circuits, components and connections of fuel system; perform necessary action. P-2

16.45 Inspect exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action. P-2

16.46 Perform exhaust system back-pressure test; determine necessary action. P-1

16.47 Test the operation of turbocharger/supercharger systems; determine necessary action. P-3

EMISSIONS CONTROL SYSTEMS DIAGNOSIS AND REPAIR

POSITIVE CRANKCASE VENTILATION

16.48 Diagnose oil leaks, emissions, and derivability problems resulting from failure of the positive crankcase ventilation (PCV) system; determine necessary action. P-1
16.49 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. P-2

EXHAUST GAS RECIRCULATION

16.50 Diagnose emissions and derivability problems caused by failure of the exhaust gas recirculation (EGR) system; determine necessary action. P-1
16.51 Inspect and test valve, valve manifold, and exhaust passages of exhaust gas recirculation (EGR) systems; perform necessary action. P-2
16.52 Inspect and test vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; perform necessary action. P-2
16.53 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action. P-2

EXHAUST GAS TREATMENT

16.54 Diagnose emissions and derivability problems resulting from failure of the secondary air injection and catalytic converter systems determine necessary action. P-2
16.55 Inspect and test mechanical components of secondary air injection systems; perform necessary action. P-2
16.56 Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. P-2
16.57 Inspect and test components of catalytic converter systems; perform necessary action. P-2

INTAKE AIR TEMPERATURE CONTROLS

16.58 Diagnose emissions and derivability problems resulting from failure of the intake air temperature control system; determine necessary action. P-3
16.59 Inspect and test components of intake air temperature control system; perform necessary action. P-3

EARLY FUEL EVAPORATION (INTAKE MANIFOLD TEMPERATURE) CONTROLS

16.60 Diagnose emissions and derivability problems resulting from failure of early fuel evaporation control systems; determine necessary action. P-3
16.61 Inspect and test components of early fuel evaporation control system; perform necessary action. P-3

EVAPORATIVE EMISSIONS CONTROLS

16.62 Diagnose emissions and derivability problems resulting from failure of evaporative emissions control system; determine necessary action. P-2
16.63 Inspect and test components and hoses of evaporative emissions control system; perform necessary action. P-2

ENGINE RELATED SERVICE

16.64 Adjust valves on engines with mechanical or hydraulic lifters. P-1
16.65 Verify correct camshaft timing; determine necessary action. P-1
16.66 Verify engine operating temperature; determine necessary action. P-1

16.67 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. P-1

16.68 Inspect and test thermostat, by-pass, and housing; perform necessary action. P-1

16.69 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. P-2

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

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.
01.02 Identify and use appropriate emergency first aid procedures.
01.03 Identify, use and maintain hand and power tools properly.
01.04 Identify and practice using appropriate precision measuring tools and torque methods.
01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, to include thread repair.
01.06 Identify and use metric and English measurement skills.
01.07 Use computer and operate keyboard.
01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
01.09 Identify and describe typical automotive lubricants and lubricant properties.
01.10 Interpret the Florida 'Workers Right To Know Law'.
01.11 Identify and describe typical automotive seals and gaskets.
01.12 Identify and use the proper procedures required for cutting tubing and double and ISO flaring.
01.13 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
01.14 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.
01.15 Describe and identify supplemental restraint systems (SRS).
01.16 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.

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

02.01 Read and interpret measuring devices (rules and tapes).
02.02 Solve number word problems.
02.03 Write percents add fractions and decimals.
02.04 Solve percent problems.
02.05 Find the percent of a number.
02.06 Operate a calculator.
02.07 Understand and use the metric system.
02.08 Convert inches to millimeters and millimeters to inches.
02.09 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
02.10 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
02.11 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
02.12 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
02.13 Understand and interpret gears and gear ratios.

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

03.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
03.02 Draw conclusions or make inferences from data.
03.03 Identify health-related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
03.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

04.0 DEMONSTRATE PROFICIENCY IN EMPLOYABILITY SKILLS--The student will be able to:

04.01 Identify employment requirements for an automotive career.
04.02 Identify documents, which may be required when applying for a job.
04.03 Complete a job application form correctly.
04.04 Identify and adopt acceptable work habits.
04.05 Demonstrate acceptable employee health habits; including infection control of blood born pathogens.
04.06 Demonstrate appropriate telephone/communication skills.
04.07 Conduct a job search.
04.08 Demonstrate competence in job interview techniques.
04.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
04.10 Demonstrate knowledge of how to make job changes appropriately.

05.0 DEMONSTRATE PROFICIENCY IN APPROPRIATE COMMUNICATION SKILLS--The student will be able to:

05.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
05.02 Read and follow written and oral instructions.
05.03 Answer and ask questions coherently and concisely.
05.04 Read critically by recognizing assumptions and implications and by evaluating ideas.

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

06.01 Define entrepreneurship.
06.02 Describe the importance of entrepreneurship to the American economy.
06.03 List the advantages and disadvantages of business ownership.
06.04 Identify the risks involved in ownership of business.
06.05 Identify the necessary personal characteristics of a successful entrepreneur.
06.06 Identify the business skills needed to operate a small business efficiently and effectively.
06.07 Identify and apply communication skills used in automotive careers.

07.0 DEMONSTRATE PROFICIENCY IN ACCEPTABLE EMPLOYEE BEHAVIOR IN THE AUTOMOTIVE INDUSTRY--The student will be able to:

07.01 Explain the effects of chemical/substance abuse.
07.02 Identify principles of stress management.
07.03 Identify and define career opportunities in the automotive service industry.
07.04 Demonstrate acceptable industry dress code.
07.05 Identify and demonstrate proper customer relation skills.
07.06 Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems.
07.07 Identify principles of time management.
07.08 Identify acceptable customer relations.

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

08.01 Inspect, test headlamps, tail lamps and stop lamps. Aim headlights.
08.02 Perform oil and filter change.
08.03 Service transmission; perform visual inspection; replace fluids and filters.
08.04 Inspect engine assembly for fuel, oil, coolant, and other leaks.
08.05 Inspect manual and power steering fluid levels and condition.
08.06 Check rear axle drive assembly seals and vents; check lube level.
08.07 Inspect and replace power steering hoses and fittings.
08.08 Lubricate suspension and steering systems.
08.09 Inspect, remove, and replace shock absorbers.
08.10 Remove, inspect, and service front and rear wheel bearings on non-drive axles.
08.11 Inspect tires, diagnose tire wear patterns. check and adjust air pressure.
08.12 Rotate tires according to manufacturer’s recommendations, install wheels, torque lug nuts.
08.13 Balance wheel and tire assembly (static and dynamic).
08.14 Dismount, inspect, repair, and remount tire on wheel.
08.15 Check master cylinder for internal and external leaks and proper operation.
08.16 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
08.17 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
08.18 Select, handle, store, and install brake fluids to proper level.
08.19 Fill master cylinder with recommended fluid and seat pads.
08.20 Inspect, clean, fill, and replace battery.
08.21 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or perform necessary action.
08.22 Start a vehicle using jumper cables using a battery auxiliary power supply.
08.23 Perform slow/fast battery charge.
08.24 Observe dash warning lamps during bulb check.
08.25 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).

08.26 Practice recommended precautions when handling static sensitive devices.
08.27 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or perform necessary action.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Title: Automotive Service Technology 2
Course Number: 8709420
Course Credit: 1

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

08.28 Inspect, replace, and adjust drive belts and pulleys.
08.29 Inspect and replace engine cooling and heater system hoses.
08.30 Inspect, test, and replace thermostat and housing.
08.31 Perform cooling system pressure tests; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; service or perform necessary action.
08.32 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; service or perform necessary action.
08.33 Determine coolant condition; drain, flush, recover and refill cooling system with recommended coolant and bleed air as required.
08.34 Inspect, test, remove, and replace water pump.
08.35 Identify and describe typical automotive lubricants and lubricant properties.
08.36 Check parking brake operation; adjust as needed.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

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

08.37 Use wiring diagrams of electrical circuit problems.
08.38 Check electrical circuits with a test light; determine necessary action.
08.39 Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM).
08.40 Check current flow in electrical/electronic circuits and components using an ammeter.
08.41 Check electrical circuits using jumper wires.
08.42 Measure and diagnose the cause(s) of abnormal key-off battery drain.
08.43 Inspect and test fusible links, circuit breakers, and fuses; perform necessary action.
08.44 Perform battery capacity (load, high-rate discharge) test; determine needed service.
08.45 Maintain or restore electronic memory functions.
08.46 Perform starter current draw and circuit voltage drop test; determine necessary action.
08.47 Remove and replace/reinstall starter.
08.48 Perform charging system test.
08.49 Remove, inspect, and replace/reinstall alternator.
08.50 Demonstrate retrieving stored diagnostic trouble codes.
08.51 Obtain and interpret digital multimeter (DMM) readings.
08.52 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.
08.53 Replace fuel filters.
08.54 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or perform necessary action.
08.55 Adjust valves on engines with mechanical lifters.
08.56 Remove and replace valve cover gaskets (ASE).
08.57 Return cores for rebuilt and exchange items.
08.58 Inspect passenger restraint system, repair if needed.

09.0 DEMONSTRATE PROFICIENCY IN ENGINE THEORY AND REPAIR--The student will be able to:

09.01 Verify and interpret engine concern; determine necessary action. P-1
09.02 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-2
09.03 Diagnose engine noises and vibrations; determine necessary action. P-3
09.04 Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action. P-3
09.05 Perform engine vacuum tests; determine necessary action. P-1
09.06 Perform cylinder power balance tests; determine necessary action. P-1
09.07 Perform cylinder compression tests; determine necessary action. P-1
09.08 Perform cylinder leakage tests; determine necessary action. P-1
09.09 Remove engine (front-wheel drive); prepare for disassembly. P-3

09.10 Reinstall engine (front-wheel drive). P-3
09.11 Remove engine (rear-wheel drive); prepare for disassembly. P-3
09.12 Reinstall engine (rear-wheel drive). P-3

CYLINDER HEAD AND VALVE TRAIN DIAGNOSIS AND REPAIR

09.13 Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition. P-2
09.14 Install cylinder heads and gaskets; tighten according to manufacturer’s specifications and procedures. P-2
09.15 Inspect and test valve springs for squareness, pressure, and free height comparison; replace as needed. P-3
09.16 Inspect valve spring retainers, locks, and valve grooves. P-2
09.17 Replace valve stem seals. P-3
09.18 Inspect valve guides for wear; check valve guide height and stem-to-guide clearance; recondition or replace as needed. P-3
09.19 Resurface valves; perform necessary action. P-2
09.20 Resurface valve seats; perform necessary action. P-2
09.21 Check valve face-to-seat contact and valve seat concentricity (run out); service seats and valves as needed. P-3
09.22 Check valve spring assembled height and valve stem height; service valve and spring assemblies as needed. P-2
09.23 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); perform necessary action. P-2
09.24 Inspect hydraulic or mechanical lifters; replace as needed. P-2
09.25 Adjust valves (mechanical or hydraulic lifters). P-1
09.26 Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear;) replace as necessary. P-2
09.27 Inspect and replace timing belt(s), overhead camdrive sprockets and tensioners; check belt tension; adjust as necessary. P-1
09.28 Inspect camshaft for run out; journal wear and lobe wear. P-3
09.29 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. P-3
09.30 Verify camshaft(s) timing according to manufacturer’s specifications and procedure. P-1

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Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

09.0 DEMONSTRATE PROFICIENCY IN ENGINE THEORY AND REPAIR--The student will be able to:

ENGINE BLOCK DIAGNOSIS AND REPAIR

09.30 Inspect and replace pans, covers, gaskets, and seals. P-2
09.31 Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action. P-2
09.32 Inspect internal and external threads; restore as needed (includes installing thread inserts). P-1
09.33 Remove cylinder wall ridges. P-3
09.34 Inspect and measure cylinder walls for damage and wear; determine necessary action. P-2
09.35 Deglaze and clean cylinder walls. P-1
09.36 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. P-3
09.37 Inspect crankshaft for surface cracks and journal damage; check oil passage condition; measure journal wear; determine necessary action. P-3
09.38 Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selections of bearings). P-2
09.39 Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition. P-3
09.40 Inspect, measure, and service pistons and pins; determine necessary action P-2
09.41 Inspect, measure, and install piston rings. P-2
09.42 Inspect, repair or replace crankshaft vibration damper (harmonic balancer). P-3
09.43 Reassemble engine components using correct gaskets and sealants. P-2
09.44 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. P-3
09.45 Prime engine lubrication system. P-1

LUBRICATION AND COOLING SYSTEMS DIAGNOSIS AND REPAIRS

09.46 Perform oil pressure tests; determine necessary action. P-1
09.47 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action. P-3
09.48 Perform cooling system, cap and recovery tests (pressure, combustion leakage, and temperature); determine necessary action. P-1
09.49 Inspect, replace, and adjust drive belts, tensioners and pulleys. P-1
09.50 Inspect and replace engine cooling and heater system hoses. P-2
09.51 Inspect, test, and replace thermostat and housing. P-2
09.52 Test coolant; drain and recover, flush, and refill cooling system with recommended coolant and bleed air as required. P-1
09.53 Inspect, test, remove, and replace water pump. P-2

09.54	Remove and replace radiator.	P-2
09.55	Inspect, and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.	P-2
09.56	Inspect auxiliary oil coolers; perform necessary action.	P-3
09.57	Inspect, test, and replace oil temperature and pressure switches and sensors.	P-2
09.58	Perform oil and filter change.	P-1

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Title: Automotive Service Technology 5
Course Number: 8709450
Course Credit: 1

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

10.01 Identify and interpret transmission concern; assure proper engine operation; determine necessary action. P-1
10.02 Diagnose unusual fluid usage, level, and condition concerns; determine necessary action. P-1
10.03 Perform pressure tests; determine necessary action. P-1
10.04 Perform lock-up converter system tests; determine necessary action. P-2
10.05 Diagnose electronic, mechanical, hydraulic, vacuum control systems concerns; determine necessary action. P-1
10.06 Diagnose noise and vibration concerns; determine necessary action. P-3

TRANSMISSION AND TRANSAXLE MAINTENANCE AND ADJUSTMENT

10.08 Inspect, adjust or replace throttle (TV)linkages or cables and check gear select indicator(as applicable). P-1
10.08 Service transmission; perform visual inspection; replace fluids and filters. P-1

IN-VEHICLE TRANSMISSION AND TRANSAXLE REPAIR

10.09 Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses. P-3
10.10 Inspect, repair, and replace governor assembly. P-3
10.11 Inspect and replace external seals and gaskets. P-2
10.12 Inspect extension housing; bushings and seals; perform necessary action. P-3
10.13 Inspect, leak test, flush, and replace cooler, lines, and fittings. P-1
10.14 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. P-3
10.15 Inspect, and test, adjust, repair or replace transmission related electrical and electronic components (includes computers, solenoids, sensors, relays, switches, and harnesses). P-1
10.16 Inspect, replace, and align powertrain mounts. P-3

OFF-VEHICLE TRANSMISSION AND TRANSAXLE REPAIR (REMOVAL, DISASSEMBLY, AND REINSTALLATION)

10.17 Remove and reinstall transmission and torque converter (rear-wheel drive). P-2
10.18 Remove and reinstall transaxle and torque converter assembly. P-2
10.19 Disassemble, clean, and inspect transmission/trans-axle. P-1
10.20 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. P-2
10.21 Inspect servo bore, piston, seals, pin, spring, and retainers; determine necessary action. P-3

10.22 Inspect accumulator bore, piston, seals, spring, and retainers; determine necessary action. P-3
10.23 Assemble transmission/trans-axle. P-1

OIL PUMP AND CONVERTER

10.24 Inspect converter flex plate, attaching parts, pilot, pump drive, and seal areas. P-2
10.25 Measure torque converter end play and check for interference; check stator clutch. P-2
10.26 Inspect, measure, and replace oil pump assembly and components. P-3
10.27 Check torque converter and transmission cooling system for contamination. P-1

GEAR TRAIN, SHAFTS, BUSHINGS AND CASE

10.28 Measure end play or preload; determine necessary action. P-1
10.29 Inspect, measure, and replace thrust washers and bearings. P-2
10.30 Inspect oil delivery seal rings, ring grooves, and sealing surface areas. P-2
10.31 Inspect bushings; replace as needed. P-2
10.32 Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); replace as needed. P-2
10.33 Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. P-2
10.34 Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action. P-2
10.35 Inspect, measure, repair, adjust or replace transaxle final drive components. P-2
10.36 Inspect and reinstall parking pawl, shaft, spring, and retainer; determine necessary action. P-3

FRICTION AND REACTION UNITS

10.37 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; replace as needed. P-2
10.38 Measure clutch pack clearance; adjust as needed. P-1
10.39 Air test operation of clutch and servo assemblies. P-1
10.40 Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed. P-2
10.41 Inspect bands and drums; adjust or replace as needed. P-3

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

11.0 DEMONSTRATE PROFICIENCY IN THE OPERATION AND ASSEMBLY OF MANUAL DRIVE TRANSMISSION/TRANSAXLE--The student will be able to:

11.01 Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action. P-1
11.03 Inspect, clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. P-1
11.05 Inspect, hydraulic clutch slave and master-cylinders, lines and hoses; perform necessary action. P-1
11.06 Inspect, release (throw-out) bearing, lever, and pivot; perform necessary action. P-1
11.05 Inspect and replace clutch pressure plate assembly and clutch disc. P-1
11.06 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable). P-1
11.07 Inspect, flywheel and ring gear for wear and cracks, measure run out; determine necessary action. P-1
11.09 Inspect engine block, clutch (bell) housing, and transmission/trans-axle case mating surface; determine necessary action. P-3
11.09 Measure flywheel-to-block run out and crankshaft end play; determine necessary action. P-3

TRANSMISSION TRANSAXLE DIAGNOSIS AND REPAIR

11.10 Remove and reinstall transmission/transaxle. P-2
11.13 Disassemble, clean, and reassemble transmission/transaxle components. P-2
11.14 Inspect transmission/transaxle case, extension housing, case mating Surfaces, bores, bushings, and vents; perform necessary action. P-3
11.13 Diagnose noise, hard shifting, jumping out of gear, and fluid leakage problems; determine necessary action. P-3
11.14 Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers. P-3
11.15 Inspect and reinstall power train mounts. P-3
11.16 Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. P-2
11.17 Remove and replace transaxle final drive. P-3
11.18 Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanisms, interlocks, and springs. P-2
11.19 Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. P-1
11.20 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. P-2
11.21 Inspect and reinstall speedometer drive gear, driven gear, vehicle Speed sensor (VSS), and retainers. P-2
11.22 Diagnose transaxle final drive assembly noise and vibration concerns; Determine necessary action. P-3
11.23 Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings,

thrust washers, and case assembly. P-2
11.24 Inspect lubrication devices (oil pump or slingers); perform necessary action. P-3
11.26 Inspect, test, and replace transmission/transaxle sensors and switches. P-1

DRIVE AND HALF SHAFT UNIVERSAL AND CONSTANT-VELOCITY (CV) JOINT DIAGNOSIS AND REPAIR

11.26 Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action. P-2
11.27 Diagnose universal joint noise and vibration concerns; perform necessary action. P-2
11.28 Replace front wheel drive (FWD) front wheel bearing. P-2
11.29 Inspect, service, and replace shafts, yokes, boots, and CV joints. P-1
11.30 Inspect, service, and replace shaft center support bearings. P-3
11.31 Check shaft balance; measure shaft run out; measure and adjust driveline angles. P-3

REAR AXLE DIAGNOSIS AND REPAIR; RING AND PINION GEARS AND DIFFERENTIAL CASE ASSEMBLY

11.32 Diagnose noise and vibration concerns; determine necessary action. P-2
11.33 Diagnose fluid leakage concerns; determine necessary action. P-2
11.34 Inspect and replace companion flange and pinion seal; measure companion flange run out. P-2
11.35 Inspect ring gear and measure run out; determine necessary action. P-2
11.36 Remove, inspect, and reinstall drive pinion and ring, gear, spacers, Sleeves, and bearings. P-2
11.37 Measure and adjust drive pinion depth. P-2
11.38 Measure and adjust drive pinion bearing preload. P-1
11.39 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). P-2
11.40 Check ring and pinion tooth contact patterns; perform necessary action. P-1
11.41 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2

11.42 Reassemble and reinstall differential case assembly; measure run out; determine necessary action. P-2

LIMITED SLIP DIFFERENTIAL

11.43 Diagnose noise, slippage, and chatter concerns; determine necessary action. P-3
11.44 Inspect and flush differential housing; refill with correct lubricant. P-2
11.45 Inspect and reinstall clutch (cone or plate) components. P-3
11.46 Measure rotating torque; determine necessary action. P-3

DRIVE AXLE SHAFT

11.47 Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. P-2
11.48 Inspect and replace rear axle shaft wheel studs. P-3
11.49 Remove and replace drive axle shafts. P-1

11.50 Inspect and replace drive axle shaft seals, bearings, and retainers. P-2
11.51 Measure drive axle flange run out and shaft end play; determine necessary action. P-2

FOUR-WHEEL DRIVE/ALL-WHEEL DRIVE COMPONENT DIAGNOSIS AND REPAIR

11.52 Diagnose noise, vibration, and unusual steering concerns; determine necessary action. P-3
11.53 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. P-3
11.54 Remove and reinstall transfer case. P-3
11.55 Disassemble, service, and reassemble transfer case and components. P-3
11.56 Inspect, front-wheel bearings and locking hubs; perform necessary action. P-3
11.57 Check drive assembly seals and vents; check lube level. P-3
11.58 Diagnose, test, adjust and replace electrical/electronic components of four-wheel drive systems. P-3

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

12.0 DEMONSTRATE PROFICIENCY IN THE OPERATION OF STEERING, SUSPENSION AND WHEEL SYSTEMS--The student will be able to:

12.02 Disable and enable supplemental restraint system (SRS) in accordance with manufacturer's procedures. P-1
12.02 Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil in accordance with manufacturer's procedures. P-1
12.05 Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action P-3
12.06 Diagnose power steering (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. P-3
12.05 Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering and fluid leakage concerns; determine necessary action. P-3
12.06 Inspect steering shaft universal-joint(s), flexible coupling (s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. P-2
12.07 Adjust manual or power non-rack and pinion worm bearing preload and sector lash. P-3
12.08 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets. P-2
12.09 Diassemble , inspect, perform necessary action and reassemble rack and pinion steering gear. P-3
12.10 Adjust manual or power rack and pinion steering gear. P-3
12.11 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. P-2
12.12 Inspect power steering fluid levels and condition. P-1
12.13 Flush, fill, and bleed power steering system. P-2
12.14 Diagnose power steering fluid leakage; determine necessary action. P-2
12.15 Remove, inspect, replace, and adjust power steering pump belt. P-1
12.16 Remove, inspect, and replace power steering pump, mounts, seals, and gaskets. P-3
12.17 Remove, inspect, and replace power steering pump pulley; check alignment. P-3
12.18 Inspect and replace power steering hoses and fittings. P-2
12.19 Inspect and replace power steering hoses and fittings. P-2
12.20 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. P-3
12.21 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. P-2
12.22 Diagnose and adjust, components of electronically-controlled steering systems; determine necessary action. P-3

SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR; FRONT SUSPENSIONS

12.23 Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action. P-1
12.24 Diagnose MacPherson strut suspension system noises body sway, and uneven riding height concerns; determine necessary action. P-1
12.25 Remove, inspect, and install upper and lower control arms, bushings,

shafts, and rebound bumpers. P-2
12.26 Remove, inspect, install, and adjust strut (compression/tension) rods and bushings. P-2
12.27 Remove, inspect, and install upper and lower ball joints on short and long arm suspension systems. P-2
12.28 Remove, inspect, and install steering knuckle assemblies. P-2
12.29 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. P-2
12.30 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. P-3
12.31 Remove, inspect and install stabilizer bar bushings, bracket and links. P-3
12.32 Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, (silencers) insulators, and upper strut bearing mount. P-1
12.33 Lubricate suspension and steering systems. P-2

REAR SUSPENSIONS

12.34 Remove, inspect, and install coil springs and spring insulators. P-2
12.35 Remove, inspect, and install transverse links, control arms, bushings, and mounts. P-2
12.36 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. P-3
12.37 Remove, inspect, and install MacPherson strut cartridge or assembly, strut coil spring, and insulators (silencers). P-2

MISCELLANEOUS SERVICE

12.38 Inspect, remove, and replace shock absorbers. P-1
12.39 Remove, inspect, and service or replace front and rear wheel bearings. P-1
12.40 Diagnose, inspect, adjust, repair or replace components of electronically-controlled suspension systems. P-2

WHEEL ALIGNMENT DIAGNOSIS, ADJUSTMENT, AND REPAIR

12.41 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.
12.42 Perform prealignment inspection; perform necessary action. P-1
12.43 Measure vehicle riding height; determine necessary action. P-1
12.44 Check and adjust front and rear wheel camber; perform necessary action. P-1
12.45 Check and adjust caster; perform necessary action. P-1
12.48 Check and adjust front wheel toe; adjust as needed.
12.49 Center steering wheel. P-1
12.48 Check toe-out-on-turns (turning radius); determine necessary action. P-2
12.49 Check SAI (steering axis inclination) and included angle; determine necessary action. P-2
12.50 Check and adjust rear wheel toe. P-2
12.51 Check rear wheel thrust angle; determine necessary action. P-2
12.52 Check for front wheel setback; determine necessary action. P-2
12.53 Check front cradle (subframe) alignment; determine necessary action. P-3

WHEEL AND TIRE DIAGNOSIS AND REPAIR

12.54	Diagnose tire wear patterns; determine necessary action.	P-1
12.55	Inspect tires; check and adjust air pressure.	P-1
12.57	Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.	P-2
12.57	Rotate tires according to manufacturer’s recommendations.	P-1
12.58	Measure wheel, tire, axle, and hub run out; determine necessary action.	P-2
12.59	Diagnose tire pull (lead) problem; determine necessary action.	P-2
12.60	Balance wheel and tire assembly (static and dynamic).	P-1
12.61	Dismount, inspect, repair, and remount tire on wheel.	P-2
12.62	Reinstall wheel; torque lug nuts.	P-1

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Title: Automotive Service Technology 8
Course Number: 8709480
Course Credit: 1

13.0 DEMONSTRATE PROFICIENCY IN THE OPERATION AND SERVICING OF AUTOMOTIVE BRAKE SYSTEM--The student will be able to:

13.01 Measure and adjust pedal height. P-2
13.02 Check master cylinder for internal and external leaks and proper operation; determine necessary action. P-2
13.03 Remove, bench bleed, and reinstall master cylinder. P-1
13.04 Diagnose poor stopping, pulling or dragging concerns caused by problems in the hydraulic system; determine necessary action. P-1
13.05 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. P-2
13.06 Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed. P-2
13.07 Select, handle, store, and install brake fluids to proper level. P-1
13.08 Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. P-3
13.09 Inspect, test, replace, and adjust height (load) sensing proportioning valve. P-3
13.10 Inspect, test, and replace components of brake warning light system. P-3
13.11 Bleed (manual, pressure, vacuum or surge) brake system. P-1
13.12 Flush hydraulic system. P-3

DRUM BRAKE DIAGNOSIS AND REPAIR

13.13 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1
13.14 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or perform necessary action. P-1
13.15 Mount brake drum on lathe machine braking surface. P-2
13.16 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. P-2
13.17 Remove and inspect wheel cylinders. P-2
13.18 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings. P-1
13.19 Install wheel, torque lug nuts, and make final checks and adjustments. P-1

DISC BRAKE DIAGNOSIS AND REPAIR

13.20 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1
13.21 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action. P-1
13.22 Clean and inspect caliper mounting and slides for wear and damage; determine necessary action. P-1
13.23 Remove, clean, and inspect pads and retaining hardware; determine necessary action. P-1

13.24 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. P-1
13.25 Reassemble, lubricate, and reinstall caliper, pads, and related hardware, seat pads, and inspect for leaks. P-1
13.26 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer’s recommendations in determining need to machine or replace. P-1
13.27 Refinish rotor according to manufacturer’s recommendations. P-1
13.28 Adjust calipers with integrated parking brake system. P-3
13.29 Install wheel, torque lug nuts, and make final checks and adjustments. P-1
13.30 Remove and replace rotor. P-2

POWER ASSIST UNITS DIAGNOSIS AND REPAIR

13.31 Test pedal free travel with and without engine running; check power assist operation. P-2
13.32 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. P-2
13.33 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action. P-3
13.34 Inspect and test hydro-boost system and accumulator for leaks and proper operation; necessary action. P-3

MISCELLANEOUS (WHEEL BEARINGS, PARKING BRAKES, ELECTRICAL, ETC.) DIAGNOSIS AND REPAIR

13.35 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. P-1
13.36 Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings. P-1
13.37 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed. P-2
13.38 Check parking brake operation; adjust as needed. P-1
13.39 Check operation of parking brake indicator light system. P-3
13.40 Check operation of brake stop light system; adjust and service as needed. P-1
13.41 Replace wheel bearing and race. P-1

ANTI-LOCK BRAKE SYSTEM

13.42 Inspect and test anti-lock brake system (ABS)components; determine necessary action. P-2
13.43 Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise concerns caused by the anti-lock brake system (ABS); determine necessary action. P-2
13.44 Diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action. P-1
13.45 Depressurize high pressure components of the anti-lock brake system (ABS) following manufacturer's recommended safety procedures. P-2
13.46 Bleed the anti-lock brake system’s (ABS) front and rear hydraulic circuits following manufacturer's procedures. P-2
13.47 Remove and install anti-lock brake system (ABS) electrical/electronic/ hydraulic components following manufacturer's procedures and specifications. P-3
13.48 Service, test, and adjust anti-lock brake system (ABS) speed sensors following manufacturer's recommended procedures. P-2

13.49 Diagnose anti-lock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc. P-3

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Title: Automotive Service Technology 9
Course Number: 8709490
Course Credit: 1

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

14.01 Use wiring diagrams during diagnosis of electrical circuit problems. P-1
14.02 Check electrical circuits with a test light; determine necessary action. P-2
14.03 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine necessary action. P-1
14.04 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action. P-1
14.06 Check continuity and resistance(s) in electrical/electronic circuits And components with an ohmmeter; determine necessary action. P-1
14.06 Check electrical circuits using jumper wires; determine necessary action. P-2
14.07 Locate shorts, grounds, opens, and resistance problems in electrical/ electronic circuits; determine necessary action. P-1
14.08 Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action. P-1
14.09 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. P-1
14.10 Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; repair or perform necessary action. P-1
14.11 Repair wiring harnesses and connectors. P-1
14.12 Perform solder repair of electrical wiring. P-1

BATTERY DIAGNOSIS AND SERVICE

14.10 Perform battery state-of-charge test; determine needed service. P-1
14.11 Perform battery capacity test; determine needed service P-1
14.12 Maintain or restore electronic memory functions. P-2
14.13 Inspect, clean, fill, and replace battery. P-2
14.14 Perform slow/fast battery charge. P-2
14.15 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed. P-1
14.16 Start a vehicle using jumper cables and a battery or auxiliary power supply according to manufacturers' recommended specifications. P-1

STARTING SYSTEM DIAGNOSIS AND REPAIR

14.17 Perform starter current draw tests. Determine necessary action. P-1
14.19 Perform starter circuit voltage drop tests; determine necessary action. P-1
14.19 Inspect and test starter relays and solenoids; replace as needed. P-2
14.20 Remove and install starter. P-2
14.21 Perform starter bench tests; determine necessary action. P-3
14.23 Inspect, and test switches, connectors, and wires of starter control circuits; perform necessary action. P-2
14.23 Disassemble, clean, inspect, and test starter components; replace as needed. P-3

CHARGING SYSTEM DIAGNOSIS AND REPAIR

14.24 Perform charging system output test; determine necessary action. P-1
14.25 Diagnose charging system for the cause of undercharge, no charge, and overcharge conditions. P-1
14.26 Inspect and adjust generator (alternator) drive belts; replace as needed. P-1
14.27 Inspect and test voltage regulator/regulating circuit; perform necessary action. P-2
14.28 Remove, inspect, and install generator (alternator). P-2
14.29 Disassemble, generator (alternator), clean, inspect, and test components; determine necessary action. P-3
14.30 Perform charging circuit voltage drop tests; determine necessary action. P-1

LIGHTING SYSTEMS DIAGNOSIS AND REPAIR

14.31 Diagnose the cause of brighter than normal, intermittent, dim or no light operation; determine necessary action. P-2
14.32 Inspect, replace, and aim headlights and bulbs. P-2
14.33 Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. P-2

GAUGES, WARNING DEVICES, AND DRIVER INFORMATION SYSTEMS DIAGNOSIS AND REPAIR

14.34 Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action. P-2
14.35 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or determine necessary action. P-3
14.36 Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. P-1
14.37 Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; determine necessary action. P-3

HORN AND WIPER/WASHER DIAGNOSIS AND REPAIR

14.38 Diagnose incorrect horn operation; perform necessary action. P-3
14.39 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. P-3
14.40 Diagnose incorrect windshield washer operation; perform necessary action. P-3

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

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

ACCESSORIES DIAGNOSIS AND REPAIR

14.41 Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. P-2
14.42 Diagnose incorrect heated glass operation; determine necessary action. P-3
14.43 Diagnose incorrect electric lock operation; determine necessary action. P-3
14.44 Diagnose incorrect operation of cruise control systems; repair as needed. P-3
14.45 Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (NOTE: Follow manufacturer's safety procedures to prevent accidental deployment.) P-2
14.46 Diagnose radio static and weak, intermittent, or no radio reception, determine necessary action. P-3

15.0 DEMONSTRATE PROFICIENCY IN HEATING, AIR CONDITIONING AND ENGINE COOLING SYSTEMS--The student will be able to:

15.01 Diagnose unusual operating noises in the A/C system; determine necessary action. P-2
15.03 Identify refrigerant type; conduct a performance test of the A/C System; determine necessary action. P-1
15.03 Leak test A/C system; determine necessary action. P-1
15.04 Inspect the condition of discharged oil; determine necessary action. P-2
15.06 Select oil type; measure and add oil to the A/C system as needed. P-2

REFRIGERATION SYSTEM COMPONENT DIAGNOSIS AND REPAIR
COMPRESSOR AND CLUTCH

15.06 Diagnose A/C system problems that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. P-2
15.07 Inspect A/C compressor drive belts; replace and adjust as needed. P-2
15.08 Inspect, test, and replace A/C compressor clutch components or assembly. P-2
15.09 Remove and replace A/C compressor and mountings. P-2

EVAPORATOR, RECEIVER/DRIER, CONDENSER, ETC.

15.10 Determine need for A/C system filter; perform necessary action. P-3
15.11 Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; perform necessary action. P-2
15.12 Inspect A/C condenser for air flow restrictions; perform necessary action. P-1
15.13 Remove and install receiver/drier or accumulator/drier. P-2

15.14 Remove and install expansion valve or orifice (expansion) tube. P-2
15.15 Inspect evaporator housing water drain; perform necessary action. P-3

HEATING AND ENGINE COOLING SYSTEMS DIAGNOSIS AND REPAIR

15.16 Diagnose temperature control problems in the heater/ventilation system; determine necessary action. P-2
15.17 Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action. P-1
15.18 Inspect engine cooling and heater system hoses and belts; perform necessary action. P-1
15.19 Inspect, test, and replace thermostat and housing. P-1
15.20 Determine coolant condition; drain and recover coolant. P-1
15.21 Flush system; refill with recommended coolant; bleed system. P-1
15.22 Inspect, and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; perform necessary action. P-1
15.23 Inspect and test electrical fan control system and circuits. P-1
15.24 Inspect and test heater control valve(s); perform necessary action. P-2

OPERATING SYSTEMS AND RELATED CONTROLS DIAGNOSIS AND REPAIRS

15.25 Diagnose failures in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action. P-2
15.26 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action. P-2
15.27 Test A/C compressor load cut-off systems; determine necessary action. P-3

VACUUM/MECHANICAL

15.28 Diagnose failures in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. P-2
15.29 Inspect and test A/C-heater control panel assembly; determine necessary action. P-3
15.30 Inspect and test A/C-heater control cables and linkages; perform necessary action. P-3
15.31 Inspect and test A/C-heater ducts, doors, hoses, and outlets; perform necessary action. P-3

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

15.0 DEMONSTRATE PROFICIENCY IN HEATING, AIR CONDITIONING AND ENGINE COOLING SYSTEMS--The student will be able to:

AUTOMATIC AND SEMI-AUTOMATIC TEMPERATURE CONTROLS

15.32 Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action. P-3

REFRIGERANT RECOVERY, RECYCLING, AND HANDLING

15.33 Verify correct operation and maintenance of refrigerant handling equipment. P-1
15.34 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant. P-1
15.35 Recycle refrigerant. P-1
15.36 Label and store refrigerant. P-1
15.37 Test recycled refrigerant for non-condensable gases. P-1
15.38 Evaluate and charge A/C system. P-1

16.0 DEMONSTRATE PROFICIENCY IN ENGINE PERFORMANCE SERVICES--The student will be able to:

16.01 Interpret and verify concern; determine necessary action. P-1
16.02 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-2
16.03 Diagnose unusual engine noise or vibration concerns; determine necessary action. P-2
16.04 Diagnose unusual exhaust color, odor, and sound; determine necessary action. P-2
16.05 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. P-1
16.06 Perform cylinder power balance test; determine necessary action. P-1
16.07 Perform cylinder compression test; determine necessary action. P-1
16.08 Perform cylinder leakage test; determine necessary action. P-1
16.09 Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and engine diagnostic equipment; determine necessary action. P-1
16.10 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret readings and determine necessary action. P-1

COMPUTERIZED ENGINE CONTROLS DIAGNOSIS AND REPAIR

16.11 Retrieve and record stored OBDII diagnostic trouble codes; clear codes. P-1
16.12 Diagnose the causes of emissions or derivability concerns resulting from failure of computerized engine controls with stored diagnostic trouble codes. P-1
16.15 Diagnose emissions or derivability concerns resulting from failure of computerized engine controls with no stored diagnostic trouble codes

determine necessary action. P-1

16.16 Inspect, and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits; perform necessary action. P-2

16.15 Obtain and interpret digital multimeter (DMM) readings. P-1

16.16 Access and use electronic service information (ESI). P-3

16.17 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals). P-1

16.18 Inspect and test power and ground circuits and connections; service or replace as needed. P-1

16.19 Practice recommended precautions when handling static sensitive devices. P-2

16.20 Diagnose derivability and emissions problems resulting from failures of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, and similar systems); determine necessary action. P-2

IGNITION SYSTEM DIAGNOSIS AND REPAIR

16.21 Diagnose no-starting, derivability, and emissions concerns on vehicles with electronic ignition (EI/DIS)(distributorless) systems; determine necessary action. P-1

16.22 Diagnose no-starting, derivability, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action. P-1

16.23 Inspect and test ignition primary circuit wiring and components; perform necessary action. P-2

16.24 Inspect and test distributor; perform necessary action. P-3

16.25 Inspect and test ignition system secondary circuit wiring and components; perform necessary action. P-2

16.26 Inspect and test ignition coil(s); perform necessary action. P-2

16.27 Check and adjust (where applicable) ignition system timing and timing advance/retard. P-1

16.29 Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action. P-2

16.30 Inspect and test ignition control module; perform necessary action. P-2

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

16.0 DEMONSTRATE PROFICIENCY IN ENGINE PERFORMANCE SERVICES--The student will be able to:

FUEL, AIR INDUCTION, AND EXHAUST SYSTEMS DIAGNOSIS AND REPAIR

16.31 Diagnose hot or cold no-starting, hard starting, poor derivability, 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. P-3
16.32 Diagnose hot or cold no-starting, hard starting, poor derivability, 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. P-1
16.34 Inspect fuel tank and fuel cap, fuel lines, fittings, and hoses; perform necessary action. P-2
16.34 Check fuel for contaminants and quality; determine necessary action. P-2
16.35 Inspect and test mechanical and electrical fuel pumps and pump control systems; perform necessary action. P-2
16.36 Replace fuel filters. P-1
16.37 Inspect and test fuel pressure regulation system and components of injection-type fuel systems; perform necessary action. P-1
16.38 Inspect and test cold enrichment system and components; perform necessary action. P-3
16.39 Remove, service, and install throttle body; adjust related linkages. P-2
16.40 Inspect, test and clean fuel injectors . P-2
16.41 Inspect throttle body mounting plates, air induction and filtration system, intake manifold, and gaskets; perform necessary action. P-2
16.42 Check idle speed and fuel mixture. P-2
16.43 Adjust idle speed and fuel mixture. P-3
16.44 Remove, inspect, and test vacuum and electrical circuits, components and connections of fuel system; perform necessary action. P-2
16.45 Inspect exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action. P-2
16.46 Perform exhaust system back-pressure test; determine necessary action. P-1
16.47 Test the operation of turbocharger/supercharger systems; determine necessary action. P-3

EMISSIONS CONTROL SYSTEMS DIAGNOSIS AND REPAIR
POSITIVE CRANKCASE VENTILATION

16.48 Diagnose oil leaks, emissions, and derivability problems resulting from failure of the positive crankcase ventilation (PCV) system; determine necessary action. P-1
16.49 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. P-2

EXHAUST GAS RECIRCULATION

16.50 Diagnose emissions and derivability problems caused by failure of the exhaust gas recirculation (EGR) system; determine necessary action. P-1
16.51 Inspect and test valve, valve manifold, and exhaust passages of exhaust gas recirculation (EGR) systems; perform necessary action. P-2
16.52 Inspect and test vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; perform necessary action. P-2
16.53 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action. P-2

EXHAUST GAS TREATMENT

16.54 Diagnose emissions and derivability problems resulting from failure of the secondary air injection and catalytic converter systems determine necessary action. P-2
16.55 Inspect and test mechanical components of secondary air injection systems; perform necessary action. P-2
16.56 Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. P-2
16.57 Inspect and test components of catalytic converter systems; perform necessary action. P-2

INTAKE AIR TEMPERATURE CONTROLS

16.58 Diagnose emissions and derivability problems resulting from failure of the intake air temperature control system; determine necessary action. P-3
16.59 Inspect and test components of intake air temperature control system; perform necessary action. P-3

EARLY FUEL EVAPORATION (INTAKE MANIFOLD TEMPERATURE) CONTROLS

16.60 Diagnose emissions and derivability problems resulting from failure of early fuel evaporation control systems; determine necessary action. P-3
16.61 Inspect and test components of early fuel evaporation control system; perform necessary action. P-3

EVAPORATIVE EMISSIONS CONTROLS

16.62 Diagnose emissions and derivability problems resulting from failure of evaporative emissions control system; determine necessary action. P-2
16.63 Inspect and test components and hoses of evaporative emissions control system; perform necessary action. P-2

ENGINE RELATED SERVICE

16.64 Adjust valves on engines with mechanical or hydraulic lifters. P-1
16.65 Verify correct camshaft timing; determine necessary action. P-1
16.66 Verify engine operating temperature; determine necessary action. P-1
16.67 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. P-1

16.68 Inspect and test thermostat, by-pass, and housing; perform necessary action. P-1

16.69 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. P-2