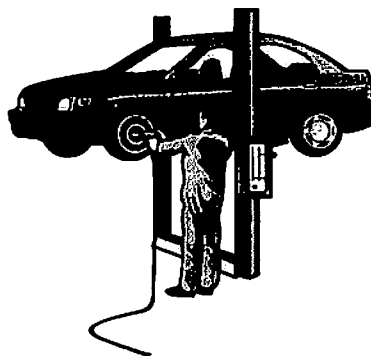
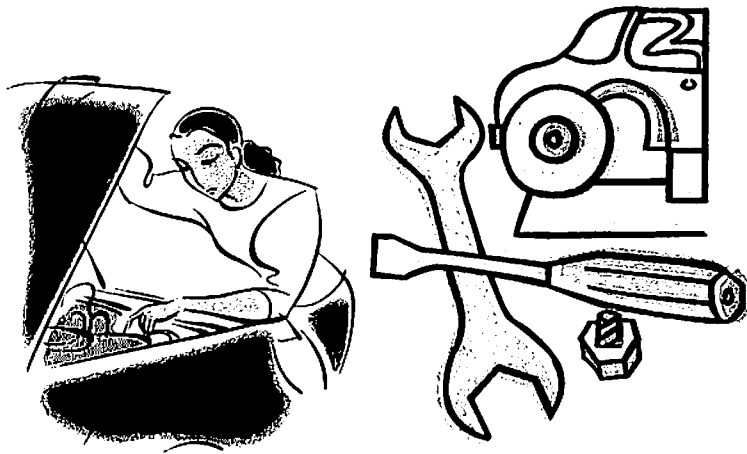


# Lewis & Clark Career Center

## Curriculum Guide

### Auto Service Technology



# **Curriculum Guide For Auto Service Technology**

**Course Rationale, Course Description, Units of Study**

**Competencies**

**Crosswalk to Show Me Standards**

**Articulation Agreements**

**Employer Survey / Advisory Board Minutes**

**Instructional Methods**

**Integrated Lesson Sample**

**Work Experience Program**

**SkillsUSA Officers**

**Teacher Certification**

**School and Program Policies and Procedures**

**Inventory**

**Program Enrollment Data**

**Placement Data**

**Program Evaluation**

**Program Brochures/Enrollment Packet**

**Miscellaneous**

## **AUTO SERVICE TECHNOLOGY**

2 year program; 3 units of credit per year

This course is open to individuals who have an interest in auto service trades in terms of a career goal. It is recommended that students have credit in general shop, general metals course and basic computer skills.

Automotive instruction at Lewis & Clark consists of a two-year program that provides the student with the basic theory and skills needed to become an automotive technician and service today's automobiles. Classroom instruction is followed by shop activities related to the lecture. Customer cars are repaired in the same manner as in the professional shop under the instructor's supervision. Students will gain experience in shop management by writing repair orders, ordering parts, issuing supplies and tools used in the trade.

This course is ASE (Automotive Service Excellence) certified by NATEF (National Automotive Technician Education Foundation). Both NATEF and ASE are nationally recognized and provide certification for shops and technicians across the country.

Areas of instruction include:

Engine Repair

Brakes

Steering and Suspension

Heating / Air Conditioning

Electrical / Electronics

Engine Performance

Instructional time is (approximately) 50% class and 50% lab.

**LEWIS & CLARK CAREER CENTER**

**AUTO SERVICE TECHNOLOGY  
UNITS OF STUDY**

OK 2/5/14

- Orientation
- Engine Repair
- Lubrication, Heating, & Cooling
- Electrical/Computer Systems
- Engine Performance/Fuel Injection Systems
- Manual Drivetrain & Axles (Basic Information)
- Brakes
- Suspension & Steering Systems/Occupant Safety Systems
- Cylinder Head Service
- Automatic Transmission/Transaxle (Basic Information)
- Differentials & 4 Wheel Drive (Basic Information)
- Air Conditioning (EPA Certification)
- Employability Skills
- SkillsUSA
- **In addition to a Statewide Articulation Agreement, this program also has specific Articulation agreements with:  
St. Louis Community College (Forest Park)  
Linn State Technical College  
Universal Technical Institute**
- **Participate in: Ford/AAA student Quality Care Challenge  
Missouri Dealers Assoc. Competition**

**AYES - School**

**LEWIS & CLARK CAREER CENTER  
AUTO SERVICE TECHNOLOGY**

**COURSE OUTLINE**

**AUTO SERVICE I - MR. LEWIS**

KLOS

UNIT	TITLE	COMPETENCIES	HRS. AM/PM	HRS. X-DAY
I	Engine Repair	M1-2, N1-2, O1-6, P1-2	96.0	102.0
II	Lubrication, Heating, & Cooling	Q1-6, Hh1-2, Ee2	14.0	15.0
III	Electrical System	D1-5, E1-4, F1-3, G1-4, H1-2, I1-2	165.0	180.0
IV	Engine Performance	J1-6, K1-4, K8, L1-9	160.0	173.0
V	Manual Drivetrain & Axles	Z1-2, Aa1-3, Bb1-3, U-4	60.00	70.0
<b>AUTO SERVICE I TOTAL HOURS</b>			<b>495.0</b>	<b>540.0</b>

**AUTO SERVICE II - MR. REESE**

UNIT	TITLE	COMPETENCIES	HRS. AM/PM	HRS. X-DAY
I	Brakes	V1-3, W1-3, X1-3, Y1-4	93.0	100.0
II	Suspension & Steering Systems	R1-8, S1-6, T1-4, U1-3	93.0	100.0
III	Cylinder Head Service	N1-4	17.0	18.0
IV	Automatic Transmission/Transaxle	Ee1, Ee3-5, Ff1-5	115.0	120.0
V	Engine Performance	K5-7, L1-9	85.0	87.0
VI	Differentials & 4 Wheel Drive	Cc1-3, Dd1-6	29.0	30.0
VII	Air Conditioning	Gg1-4	63.0	65.0
<b>AUTO SERVICE II TOTAL HOURS</b>			<b>495.</b>	<b>540.0</b>

**AUTO SERVICE TECHNOLOGY PROGRAM TOTAL HOURS**

<b>990.0</b>	<b>1080.0</b>
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## **Auto Service Technology I Class Overview**

### **Introduction**

- Introduction to the school, code of conduct, and customer relations.
- Safety Training (Students must pass a safety test by 100% before being allowed in the shop.)
- Reading repair manuals and using computerized service programs such as Mitchell of Demand and All Data.
- Writing repair orders.
- Figuring estimates.
- Writing customer tickets.

### **Engines**

- Identification of engine components.
- Proper use of hand tools,
- Precision measuring devices.
- Specialty tools.
- Teams of two students are assigned to an engine. They must disassemble the engine, properly clean and prepare the components, identify and document the required measurements, and determine what is needed to rebuild the assembly. Proper reassembly then completes the engine section.

### **Lubrication, Heating and Cooling Systems**

### **Basic Electrical Diagnosis and Repair**

### **Engine Performance, and Diagnosis**

### **Manual Transmissions/Transaxles, Clutches, and Driveline**

## **Auto Service Technology II Class Overview**

### **Introduction:**

- Review writing and understanding repair orders.
- Looking up parts, ordering parts and controlling inventories.
- Getting all needed information to give an accurate estimate by talking with the customer about the problem, diagnosis, looking up parts prices, and flat rate times.

### **Brakes:**

- Hydraulics component overhaul (master cylinder, wheel cylinder)
- Resurface rotors and drums.
- Diagnosis and repair of brake systems.
- Anti-lock brake systems are also covered.

### **Steering and Suspension:**

- Diagnosis of steering and suspension problems.
- Repair of steering mechanisms.
- Front-end alignment.
- Steering gear boxes.
- Steering racks.

### **Cylinder Heads:**

- Identify all valve train components and their function and diagnosis.
- Grind valves and seats.
- Knurling valve guides.
- R & R cylinder heads.

### **Automatic Transmission/Trans-Axle:**

- Disassemble and identify components.
- R & R bushings and seals.
- Transmission pressure adjustments and mountings.

### **Computer Control Emissions:**

- Identification and their function in the system including set-up of electronic test equipment and testing of individual components. This includes using a D.V.O.M. to diagnose circuits in the computer system. Schematics will be utilized in circuit testing.

### **Differentials/Transfer Cases/Front Locking Hubs:**

- Recognizing components, set-up differentials.

### **Air Conditioning:**

- Evacuation and recharging of A/C systems.
- Operation of Refrigerant Recovery Equipment and diagnosis of systems, air flow, and controls.



# LEWIS & CLARK

## CAREER CENTER

### AUTO SERVICE TECHNOLOGY COMPETENCIES

STUDENT:

ID NO:

Rating Scale:           3     Mastered  
                               2     Requires Supervision  
                               1     Not Mastered  
                               N     No Exposure

3	2	1	N	A. Safety
				1. Identify the safe use of chemicals ASE NONE
				2. Identify the safe use of hand tools ASE NONE
				3. Identify the safe use of power tools ASE NONE
				4. Identify the safe use of protective clothing and equipment ASE NONE
				5. Identify safe use of fire protection equipment ASE NONE
				6. Identify the safe use of shop equipment ASE NONE
				7. Follow Environmental Protection Agency (EPA) and Occupational Safety and Health Act (OSHA) regulation ASE NONE

3	2	1	N	B. Shop Operations
				1. Communicate with customers and write repair orders ASE NONE
				2. Estimate time and cost for job and order parts ASE NONE
				3. Obtain appropriate repair information from shop manuals ASE NONE
				4. Practice clean and orderly work habits (vehicle, tools and work area) ASE NONE

3	2	1	N	C. Components and Careers
				1. Identify basic function and operation of vehicle mechanical components ASE NONE
				2. Identify auto mechanics career opportunities and the duties of a technician ASE NONE

3	2	1	N	D. General Electrical System Diagnosis
				1. Check continuity in electrical circuits using test light and voltmeter, oscilloscope and wiring diagram (ASE E05)
				2. Check for shorts, opens, and ground (ASE F006-F010)
				3. Measure resistance in electrical circuits using an ohmmeter (ASE F006)
				4. Measure volts with a voltmeter or oscilloscope (ASE E053, E054, F004)
				5. Measure current with an ammeter (ASE F005)

3	2	1	N	E. Battery Diagnosis and Service
				1. Clean and inspect battery clamps, cables, and connectors (ASE F014, F015, F017)
				2. Perform battery condition tests (ASE F011-F013, F016)
				3. Jump start a vehicle (ASE F018)
				4. Charge and install a battery (ASE F015)

3	2	1	N	F. Starting System Diagnosis and Repair
				1. Diagnose charging system and determine needed repairs (ASE F019, F020)

					2. Remove, clean, and inspect starter motor and components (ASE F021-F024)
					3. Repair or replace starter motor components (ASE F021-F024)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>G. Charging System Diagnosis and Repair</b>
				1. Diagnose charging system and determine needed repairs (ASE F025, F027, F029, F031)
				2. Remove, clean, and inspect alternator (ASE F026, F030, F033)
				3. Repair or replace alternator components (ASE F028-F030)
				4. Repair or replace charging system components (ASE F028-F030)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>H. Lighting System Diagnosis and Repair</b>
				1. Diagnose lighting system problems and determine needed repairs (ASE F034-F052)
				2. Repair or replace lights, sockets, wires, and switches (ASE F035, F036, F038, F040, F042, F044, F046, F047, F049)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>I. Gauges and Electrical Accessories</b>
				1. Diagnose and repair gauge and warning circuits (ASE A061, E053, E054, F053-62, H043)
				2. Diagnose and repair electrical accessories (horn, wiper, motor) (ASE F063-F103)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>J. Ignition System</b>
				1. Conduct engine performance test using engine analyzer and determine needed repairs (ASE H001-H013, H023)
				2. Inspect, repair, or replace primary ignition components (ASE H014, H017, H019-H022)
				3. Inspect, repair, or replace secondary ignition components (ASE H015, H017, H019, H022)
				4. Adjust ignition system to manufacturer's specifications (ASE H016, H018, H023)
				5. Perform on-board computer system diagnosis (ASE H011)
				6. Repair or replace computer system components (ASE H12)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>K. Fuel and Exhaust Systems</b>
				1. Diagnose fuel system problems and determine needed repairs (ASE H024, H025, H035, H039-H041, H045)
				2. Inspect, repair, or replace fuel supply component (ASE H026-H028, H031, H042-H044, H046)
				3. Disassemble, clean, and inspect carburetors (ASE H030)
				4. Reassemble and adjust carburetors (ASE H029, H030, H032)
				5. Disassemble, clean, and inspect fuel injection components (ASE H029, H037, H038)
				6. Repair or replace fuel inject components (ASE H029, H034, H036-H038, H044)
				7. Adjust computer-controlled fuel systems (injection and carburetion) (ASE H033, H034, H036, H037, H047, H048)
				8. Diagnose and repair exhaust system problems (ASE H049)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>L. Emission Control System</b>
				1. Diagnose emission control systems and determine needed repairs (ASE H050, H052, H055, H059)
				2. Clean, inspect/replace PCV system components (ASE H051)
				3. Clean, inspect/replace spark timing controllers (ASE H053, H054)
				4. Clean, inspect/replace idle speed controllers (ASE H056-H058)
				5. Clean, inspect/replace exhaust gas recirculation (ASE H060-H062)
				6. Clean, inspect/replace air management system (ASE H063-H070)
				7. Clean, inspect/replace inlet air temperature control (ASE H071-H073)
				8. Clean, inspect/replace intake manifold heat controls (ASE H074-H076)
				9. Clean, inspect/replace fuel vapor controls (ASE H077-H080)

3	2	1	N	<b>M. General Engine Diagnosis – Remove and Replace</b>
				1. Conduct performance tests and determine needed repair (ASE A001-A008)
				2. Remove and replace engine (front- and rear-wheel drive) (ASE A009-A012)

3	2	1	N	<b>N. Cylinder Head and Valve Train Diagnosis and Repair</b>
				1. Remove cylinder head(s) (ASE A013)
				2. Install cylinder head(s) (ASE A014, A043-A046, A051)
				3. Recondition cylinder head (ASE A015-A025, A028, A036)
				4. Inspect and replace cam and related components (ASE A023-A027, A029, H081, H082)

3	2	1	N	<b>O. Short Block Diagnosis and Repair</b>
				1. Inspect and replace pans, covers, gaskets, and seals (ASE A030)
				2. Disassemble, inspect, and clean short block assembly (ASE A031-A034, A043-A046)
				3. Check and record short block measurements (ASE A034, A036, A051)
				4. Check and record component measurements (ASE A034, A037-A040)
				5. Clean and prep block and components from reassembly (ASE A028, A035, A037-A040)
				6. Reassemble short block components using correct lubricants, gaskets, sealers, and torque specifications (ASE A0)

3	2	1	N	<b>P. Engine Completion and Start-Up Procedure</b>
				1. Complete engine assembly and pre-lube (ASE A025, A049, H081, H082)
				2. Start engine and set fuel and ignition system to manufacturer's specifications (ASE A050, H018, H029-H032)

3	2	1	N	<b>Q. Lubrication and Cooling System Diagnosis and Repair</b>
				1. Inspect and repair oil system and components (ASE A050, A051, A061)
				2. Perform cooling system tests; determine needed repairs (ASE A052, A057, G026, H083, H084, H086)
				3. Inspect, replace, and adjust drive belts and hoses (ASE A053, A054, G027, G029)
				4. Replace cooling system components (thermostat, radiator, controllers) (ASE A055, A058, A059, G028, G031, G032)
				5. Inspect coolant, drain, flush, and refill cooling system with recommended coolant (ASE A056-A058, G030, G033)
				6. Perform oil and lube service on normally aspirated and turbo-charged engines (ASE A060, A062)

3	2	1	N	<b>R. Steering Systems</b>
				1. Diagnose and determine needed repairs on steering systems (ASE D001-D005, D015-D018, D022-D024)
				2. Clean and inspect power and manual steering gear boxes (ASE D007, D008, D022, D024)
				3. Reassemble, adjust, and install power and manual steering gear boxes (ASE D007-D009, D024)
				4. Clean and inspect power and manual rack-and-pinion steering rack (ASE D010, D011)
				5. Reassemble, adjust, and install power and manual rack and pinion steering rack (ASE D011, D012)
				6. Inspect and repair steering columns (ASE D001, D006)
				7. Inspect and replace steering linkage components (ASE D013, D014, D025-D029)
				8. Inspect, repair, and replace power steering pumps (ASE D015-D022)

3	2	1	N	<b>S. Diagnose and Repair Front Suspension Systems</b>
				1. Diagnose and determine needed repairs on conventional and electronic front suspension systems (ASE D030, D052)
				2. Inspect and repair control arm and spring assemblies on conventional systems (ASE D032-D035, D037, D038, D043)

				3. Inspect and repair wheel spindles and bearings (ASE D036, D051, E030, E044, E049, E050)
				4. Inspect and replace shock absorbers and stabilizer bars (ASE D039, D050)
				5. Diagnose and determine needed repairs on MacPherson Strut assemblies (ASE D031, D040, D041)
				6. Clean, inspect, and assemble MacPherson Strut assemblies (ASE D040-D043)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>T. Diagnose and Repair Rear Suspension System</b>
				1. Diagnose and determine needed repairs on conventional and electronic rear suspension system (ASE D044, D052)
				2. Inspect and replace shock and spring assemblies (ASE D044, D045, D050)
				3. Inspect and replace MacPherson Strut assemblies (ASE D047, D048)
				4. Inspect and repair suspension linkages and bushing (ASE D045, D046, D049)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>U. Tire and Wheel Alignment Diagnosis and Repair</b>
				1. Diagnose steering and tire wear problems, determine needed repairs (ASE D053, D054, D058, D061, D062-D068, D070)
				2. Set correct alignment angles on front wheels (ASE D054-D062, D068)
				3. Set correct camber and toe on rear wheels (ASE D055-D057, D060, D063, D064, D074)
				4. Rotate and balance tire and wheel assemblies (ASE D069, D072-D074)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>V. Diagnose and Repair Hydraulic Systems</b>
				1. Diagnose hydraulic brake systems and determine needed repairs (ASE E001-E003, E010)
				2. Inspect and repair or replace master cylinders and lines of the hydraulic system (ASE E033-E009, E016, E017)
				3. Inspect and replace switches and valving devices (ASE E011-E015)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>W. Diagnose and Repair Drum Brakes</b>
				1. Diagnose and determine needed repairs on drum brake systems (ASE E010, E018, E019, E019, E027, E051, E052)
				2. Remove, clean, and inspect drum brake assemblies (ASE E020, E022-E027)
				3. Repair, replace switches and valving devices (ASE E011-E015)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>X. Diagnose and Repair Disc Brakes</b>
				1. Diagnose and determine needed repairs on disc brake systems (ASE E101, E031-E033, E040)
				2. Remove, clean, and inspect disc brake components (ASE E033-E036, E038)
				3. Repair, replace, and adjust disc brake components (ASE E016, E030, E035, E037, E039, E041-E044)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>Y. Diagnose and Repair Power Assist Brakes</b>
				1. Diagnose and determine needed repairs on power-assist brakes (ASE E045-E048)
				2. Repair or replace power brake components (ASE E047)
				3. Repair or replace hydra-boost components (ASE E048)
				4. Check operation of anti-skid braking systems; adjust or repair according to manufacturer's recommendations (ASE)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>Z. CLUTCH DIAGNOSIS AND REPAIR</b>
				1. Diagnose, performance test, and determine needed repair for clutch assembly (ASE C001, C008-C010)
				2. Replace and adjust clutch assembly (ASE C002-C007)

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>AA. Manual Transmission/Transaxle Diagnosis and Repair</b>
				1. Diagnose, performance test, and determine needed repair
				2. Remove, disassemble, inspect, and clean manual transmission/transaxle and shift linkages

				3. Reassemble manual transmission/transaxle assembly, check end-play and adjustments
<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>BB. Drive Shaft, CV-Joint and FWD Bearings, Diagnosis and Repair</b>
				1. Diagnose and determine needed repairs
				2. Inspect, service, and replace front axle shafts
				3. Inspect, service, and replace drive shafts
<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>CC. Differential Diagnosis and Repair</b>
				1. Diagnose and determine needed repairs
				2. Disassemble, clean and inspect differential assembly
				3. Reassemble and adjust differential assembly
<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>DD. Four-Wheel-Drive Diagnosis and Repair</b>
				1. Diagnose and determine needed repairs on transfer case
				2. Disassemble, inspect, and clean transfer case
				3. Reassemble and adjust transfer case
				4. Diagnose and determine needed repairs on hub assemblies
				5. Disassemble, clean and inspect hub assemblies
				6. Reassemble and adjust hub assemblies
<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>EE. In-car Transmission/Transaxle Diagnosis and Maintenance</b>
				1. Diagnose, performance test transmission/transaxle, and determine needed repair
				2. Service transmission and cooler and perform adjustments
				3. Inspect, adjust, and replace sensors, cables, and actuators
				4. Inspect and replace external bushings, seals, and gaskets
				5. Inspect, replace, and align power train mounts
<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>FF. Off-car Transmission/Transaxle Repair</b>
				1. Remove, disassemble, and clean transmission/transaxle assembly
				2. Clean and inspect oil pump and converter
				3. Clean and inspect gear train, shafts, bushings, and case
				4. Clean and inspect friction and reaction units
				5. Reassemble automatic transmission/transaxle assembly, check end-play and adjustment, and install assembly
<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>GG. Air Conditioning</b>
				1. Diagnose and performance test A/C systems for problems and determine needed repairs
				2. Clean, inspect, and repair A/C system components
				3. Evaluate and change A/C system and performance test
				4. Diagnose and repair automatic and electrical temperature control units

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>HH. Heating System</b>
				1. Diagnose and repair heating system problems and determine needed repairs
				2. Inspect and replace heating system components

<b>3</b>	<b>2</b>	<b>1</b>	<b>N</b>	<b>Leadership Competencies</b>
				1. Demonstrate an understanding of VICA, its structure and activities
				2. Demonstrate an understanding of one's personal values
				3. Perform tasks related to effective personal management skills
				4. Demonstrate interpersonal skills
				5. Demonstrate etiquette and courtesy
				6. Demonstrate effectiveness in oral and written communication
				7. Develop and maintain a code of professional ethics
				8. Maintain a good professional appearance
				9. Perform basic tasks related to securing and terminating employment
				10. Perform basic parliamentary procedures in a group meeting

\* Highlighted items indicate essential skills.

# NATEF TASK LIST

## ENGINE REPAIR

For every task in Engine Repair, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

### I. ENGINE REPAIR

#### A. General Engine Diagnosis; Removal and Reinstallation (R & R)

1. Identify and interpret engine concern; determine necessary action. P-1
2. Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. P-1
3. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). P-1
4. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-1
5. Diagnose engine noises and vibrations; determine necessary action. P-2
6. Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action. P-2
7. Perform engine vacuum tests; determine necessary action. P-1
8. Perform cylinder power balance tests; determine necessary action. P-1
9. Perform cylinder compression tests; determine necessary action. P-1
10. Perform cylinder leakage tests; determine necessary action. P-1
11. Remove and reinstall engine in a late model front-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition. P-1

- |                                                              |                                                                                                                                                                        |     |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 12.                                                          | Remove and reinstall engine in a late model rear-wheel drive vehicle (OBDI or newer); reconnect all attaching components and restore the vehicle to running condition. | P-3 |
| <b>I. ENGINE REPAIR</b>                                      |                                                                                                                                                                        |     |
| <b>B. Cylinder Head and Valve Train Diagnosis and Repair</b> |                                                                                                                                                                        |     |
| 1.                                                           | Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.                    | P-2 |
| 2.                                                           | Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures.                                                                 | P-1 |
| 3.                                                           | Inspect valve springs for squareness and free height comparison; determine necessary action.                                                                           | P-2 |
| 4.                                                           | Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks, and valve grooves; determine necessary action.                                 | P-2 |
| 5.                                                           | Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.                                                                        | P-3 |
| 6.                                                           | Inspect valves and valve seats; determine necessary action.                                                                                                            | P-3 |
| 7.                                                           | Check valve face-to-seat contact and valve seat concentricity (runout); determine necessary action.                                                                    | P-3 |
| 8.                                                           | Check valve spring assembled height and valve stem height; determine necessary action.                                                                                 | P-3 |
| 9.                                                           | Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.     | P-2 |
| 10.                                                          | Inspect hydraulic or mechanical lifters; determine necessary action.                                                                                                   | P-2 |
| 11.                                                          | Adjust valves (mechanical or hydraulic lifters).                                                                                                                       | P-1 |
| 12.                                                          | Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear); determine necessary action.                                                       | P-2 |

- 13. Inspect and replace timing belts (chains), overhead camdrive sprockets, and tensioners; check belt/chain tension; adjust as necessary. P-1
- 14. Inspect camshaft for runout, journal wear and lobe wear. P-2
- 15. Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action. P-3
- 16. Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedures. P-1

**I. ENGINE REPAIR**

**C. Engine Block Assembly Diagnosis and Repair**

- 1. Disassemble engine block; clean and prepare components for inspection and reassembly. P-2
- 2. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action. P-2
- 3. Inspect internal and external threads; restore as needed (includes installing thread inserts). P-2
- 4. Inspect and measure cylinder walls for damage, wear, and ridges; determine necessary action. P-2
- 5. Deglaze and clean cylinder walls. P-2
- 6. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. P-3
- 7. Inspect crankshaft for end play, straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure journal wear; check crankshaft sensor reluctor ring (where applicable); determine necessary action. P-2
- 8. Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selection of bearings). P-2
- 9. 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

- |     |                                                                                                                                                                                                   |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 10. | Inspect and measure pistons; determine necessary action.                                                                                                                                          | P-2 |
| 11. | Remove and replace piston pin.                                                                                                                                                                    | P-3 |
| 12. | Inspect, measure, and install piston rings.                                                                                                                                                       | P-1 |
| 13. | Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time. | P-2 |
| 14. | Inspect or replace crankshaft vibration damper (harmonic balancer).                                                                                                                               | P-3 |
| 15. | Assemble the engine using gaskets, seals, and formed-in-place (tube-applied) sealants, thread sealers, etc. according to manufacturer's specifications.                                           | P-2 |

**I. ENGINE REPAIR**

**D. Lubrication and Cooling Systems Diagnosis and Repair**

- |     |                                                                                                                                     |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1.  | Perform oil pressure tests; determine necessary action.                                                                             | P-1 |
| 2.  | Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.                       | P-2 |
| 3.  | Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action. | P-1 |
| 4.  | Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.                                 | P-1 |
| 5.  | Inspect and replace engine cooling and heater system hoses.                                                                         | P-1 |
| 6.  | Inspect, test, and replace thermostat and housing.                                                                                  | P-2 |
| 7.  | Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.           | P-1 |
| 8.  | Inspect, test, remove, and replace water pump.                                                                                      | P-1 |
| 9.  | Remove and replace radiator.                                                                                                        | P-2 |
| 10. | Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.                                         | P-2 |

- |     |                                                                               |     |
|-----|-------------------------------------------------------------------------------|-----|
| 11. | Inspect auxiliary oil coolers; determine necessary action.                    | P-3 |
| 12. | Inspect, test, and replace oil temperature and pressure switches and sensors. | P-2 |
| 13. | Perform oil and filter change.                                                | P-2 |

## AUTOMATIC TRANSMISSION AND TRANSAXLE

**For every task in Automatic Transmission and Transaxle, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### II. AUTOMATIC TRANSMISSION AND TRANSAXLE

#### A. General Transmission and Transaxle Diagnosis

- |    |                                                                                                                                                                                      |     |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Identify and interpret transmission/transaxle concern; assure proper engine operation; determine necessary action.                                                                   | P-1 |
| 2. | Research applicable vehicle and service information, such as transmission/transaxle system operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 3. | Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).                                                 | P-1 |
| 4. | Diagnose fluid usage, level, and condition concerns; determine necessary action.                                                                                                     | P-1 |
| 5. | Perform pressure tests; determine necessary action.                                                                                                                                  | P-1 |
| 6. | Perform stall test; determine necessary action.                                                                                                                                      | P-2 |
| 7. | Perform lock-up converter system tests; determine necessary action.                                                                                                                  | P-1 |
| 8. | Diagnose electronic, mechanical, hydraulic, vacuum control system concerns; determine necessary action.                                                                              | P-1 |

- 9. Diagnose noise and vibration concerns; determine necessary action. P-2
- 10. Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. P-1

**II. AUTOMATIC TRANSMISSION AND TRANSAXLE**

**B. Transmission and Transaxle Maintenance and Adjustment**

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

**II. AUTOMATIC TRANSMISSION AND TRANSAXLE**

**C. In-Vehicle Transmission and Transaxle Repair**

- 1. Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses. P-3
- 2. Inspect, repair, and replace governor assembly. P-3
- 3. Inspect and replace external seals and gaskets. P-2
- 4. Inspect extension housing, bushings and seals; perform necessary action. P-3
- 5. Inspect, leak test, flush, and replace cooler, lines, and fittings. P-2
- 6. Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. P-2
- 7. Diagnose electronic transmission control systems using a scan tool; determine necessary action. P-1
- 8. Inspect, replace, and align powertrain mounts. P-2

**II. AUTOMATIC TRANSMISSION AND TRANSAXLE**

**D. Off-Vehicle Transmission and Transaxle Repair**

**1. Removal, Disassembly, and Reinstallation**

1. Remove and reinstall transmission and torque converter (rear-wheel drive). P-2
2. Remove and reinstall transaxle and torque converter assembly. P-1
3. Disassemble, clean, and inspect transmission/transaxle. P-1
4. Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets). P-2
5. Inspect servo bore, piston, seals, pin, spring, and retainers; determine necessary action. P-3
6. Inspect accumulator bore, piston, seals, spring, and retainer; determine necessary action. P-3
7. Assemble transmission/transaxle. P-1

## 2. Oil Pump and Converter

1. Inspect converter flex plate, attaching parts, pilot, pump drive, and seal areas. P-2
2. Measure torque converter endplay and check for interference; check stator clutch. P-2
3. Inspect, measure, and reseal oil pump assembly and components. P-1

## 3. Gear Train, Shafts, Bushings and Case

1. Measure endplay or preload; determine necessary action. P-1
2. Inspect, measure, and replace thrust washers and bearings. P-2
3. Inspect oil delivery seal rings, ring grooves, and sealing surface areas. P-2
4. Inspect bushings; determine necessary action. P-2
5. Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); determine necessary action. P-2
6. Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. P-2

- |    |                                                                                                           |     |
|----|-----------------------------------------------------------------------------------------------------------|-----|
| 7. | Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action. | P-2 |
| 8. | Inspect, measure, repair, adjust or replace transaxle final drive components.                             | P-2 |
| 9. | Inspect and reinstall parking pawl, shaft, spring, and retainer; determine necessary action.              | P-3 |

#### 4. Friction and Reaction Units

- |    |                                                                                                                                    |     |
|----|------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action. | P-2 |
| 2. | Measure clutch pack clearance; determine necessary action.                                                                         | P-1 |
| 3. | Air test operation of clutch and servo assemblies.                                                                                 | P-1 |
| 4. | Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed.                         | P-1 |
| 5. | Inspect bands and drums; determine necessary action.                                                                               | P-2 |

## MANUAL DRIVE TRAIN AND AXLES

**For every task in Manual Drive Train and Axles, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### III. MANUAL DRIVE TRAIN AND AXLES

#### A. General Drive Train Diagnosis

- |    |                                                                                                                                                                           |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Identify and interpret drive train concern; determine necessary action.                                                                                                   | P-1 |
| 2. | Research applicable vehicle and service information, such as drive train system operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |

- 3. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). P-1
- 4. Diagnose fluid usage, level, and condition concerns; determine necessary action. P-1
- 5. Drain and fill manual transmission/transaxle and final drive unit. P-2

**B. Clutch Diagnosis and Repair**

- 1. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action. P-1
- 2. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. P-1
- 3. Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action. P-1
- 4. Inspect release (throw-out) bearing, lever, and pivot; determine necessary action. P-1
- 5. Inspect and replace clutch pressure plate assembly and clutch disc. P-1
- 6. Bleed clutch hydraulic system. P-1
- 7. Inspect, remove or replace pilot bearing or bushing (as applicable). P-1
- 8. Inspect flywheel and ring gear for wear and cracks, determine necessary action. P-1
- 9. Inspect engine block, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action. P-3
- 10. Measure flywheel runout and crankshaft endplay; determine necessary action. P-3

**III. MANUAL DRIVE TRAIN AND AXLES**

**C. Transmission/Transaxle Diagnosis and Repair**

- 1. Remove and reinstall transmission/transaxle. P-1
- 2. Disassemble, clean, and reassemble transmission/transaxle components. P-2

- |     |                                                                                                                                                                    |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 3.  | Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.                                | P-3 |
| 4.  | Diagnose noise, hard shifting, jumping out of gear, and fluid leakage concerns; determine necessary action.                                                        | P-2 |
| 5.  | Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.                                                                     | P-2 |
| 6.  | Inspect and reinstall powertrain mounts.                                                                                                                           | P-3 |
| 7.  | Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.                                                                                        | P-2 |
| 8.  | Remove and replace transaxle final drive.                                                                                                                          | P-3 |
| 9.  | Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.                                   | P-2 |
| 10. | Measure endplay or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.                                        | P-1 |
| 11. | Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.                                                                       | P-2 |
| 12. | Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.                                                              | P-2 |
| 13. | Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.                                                                  | P-3 |
| 14. | Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly. | P-2 |
| 15. | Inspect lubrication devices (oil pump or slingers); perform necessary action.                                                                                      | P-3 |
| 16. | Inspect, test, and replace transmission/transaxle sensors and switches.                                                                                            | P-1 |

### III. MANUAL DRIVE TRAIN AND AXLES

#### D. Drive Shaft and Half Shaft, Universal and Constant-Velocity (CV) Joint Diagnosis and Repair

1. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action. P-1
2. Diagnose universal joint noise and vibration concerns; perform necessary action. P-1
3. Replace front wheel drive (FWD) front wheel bearing. P-2
4. Inspect, service, and replace shafts, yokes, boots, and CV joints. P-1
5. Inspect, service, and replace shaft center support bearings. P-3
6. Check shaft balance; measure shaft runout; measure and adjust driveline angles. P-2

### III. MANUAL DRIVE TRAIN AND AXLES

#### E. Drive Axle Diagnosis and Repair

##### 1. Ring and Pinion Gears and Differential Case Assembly

1. Diagnose noise and vibration concerns; determine necessary action. P-2
2. Diagnose fluid leakage concerns; determine necessary action. P-2
3. Inspect and replace companion flange and pinion seal; measure companion flange runout. P-2
4. Inspect ring gear and measure runout; determine necessary action. P-2
5. Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings. P-2
6. Measure and adjust drive pinion depth. P-2
7. Measure and adjust drive pinion bearing preload. P-1
8. Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types). P-2
9. Check ring and pinion tooth contact patterns; perform necessary action. P-1
10. Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2

11. Reassemble and reinstall differential case assembly; measure runout; determine necessary action. P-2

### 2. Limited Slip Differential

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

### 3. Drive Axle Shaft

1. Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. P-2
2. Inspect and replace drive axle shaft wheel studs. P-3
3. Remove and replace drive axle shafts. P-1
4. Inspect and replace drive axle shaft seals, bearings, and retainers. P-2
5. Measure drive axle flange runout and shaft endplay; determine necessary action. P-2

## III. MANUAL DRIVE TRAIN AND AXLES

### F. Four-wheel Drive/All-wheel Drive Component Diagnosis and Repair

1. Diagnose noise, vibration, and unusual steering concerns; determine necessary action. P-3
2. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. P-3
3. Remove and reinstall transfer case. P-3
4. Disassemble, service, and reassemble transfer case and components. P-3
5. Inspect front-wheel bearings and locking hubs; perform necessary action. P-3
6. Check drive assembly seals and vents; check lube level. P-3

7. Diagnose test, adjust, and replace electrical/electronic components of four-wheel drive systems. P-3

## SUSPENSION AND STEERING

For every task in Suspension and Steering, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

### IV. SUSPENSION AND STEERING

#### A. General Suspension and Steering Systems Diagnosis

1. Identify and interpret suspension and steering concern; determine necessary action. P-1
2. Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. P-1
3. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). P-1

#### B. Steering Systems Diagnosis and Repair

1. Disable and enable supplemental restraint system (SRS). P-1
2. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). P-1
3. Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action. P-2
4. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. P-3

5. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. P-3
6. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. P-2
7. Adjust manual or power non-rack and pinion worm bearing preload and sector lash. P-3
8. Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets. P-1
9. Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. P-1
10. Inspect power steering fluid levels and condition. P-1
11. Flush, fill, and bleed power steering system. P-2
12. Diagnose power steering fluid leakage; determine necessary action. P-2
13. Remove, inspect, replace, and adjust power steering pump belt. P-1
14. Remove and reinstall power steering pump. P-3
15. Remove and reinstall power steering pump pulley; check pulley and belt alignment. P-3
16. Inspect and replace power steering hoses and fittings. P-2
17. Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. P-2
18. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. P-1
19. Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action. P-3

## IV. SUSPENSION AND STEERING

### C. Suspension Systems Diagnosis and Repair

#### 1. Front Suspension

1. Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action. P-1
2. Diagnose strut suspension system noises, body sway, and uneven riding height concerns; determine necessary action. P-1
3. Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. P-3
4. Remove, inspect and install strut rods (compression/tension) and bushings. P-2
5. Remove, inspect, and install upper and/or lower ball joints. P-2
6. Remove, inspect, and install steering knuckle assemblies. P-2
7. Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. P-2
8. Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. P-3
9. Remove, inspect, and install stabilizer bar bushings, brackets, and links. P-2
10. Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. P-1
11. Lubricate suspension and steering systems. P-2

#### 2. Rear Suspension

1. Remove, inspect, and install coil springs and spring insulators. P-2
2. Remove, inspect, and install transverse links, control arms, bushings, and mounts. P-2
3. Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. P-3

4. Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers). P-2

### 3. Miscellaneous Service

1. Inspect, remove, and replace shock absorbers. P-1
2. Remove, inspect, and service or replace front and rear wheel bearings. P-1
3. Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action. P-3

## IV. SUSPENSION AND STEERING

### D. Wheel Alignment Diagnosis, Adjustment, and Repair

1. Differentiate between steering and suspension concerns using principles of steering geometry (caster, camber, toe, etc). P-1
2. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action. P-1
3. Perform prealignment inspection; perform necessary action. P-1
4. Measure vehicle riding height; determine necessary action. P-1
5. Check and adjust front and rear wheel camber; perform necessary action. P-1
6. Check and adjust caster; perform necessary action. P-1
7. Check and adjust front wheel toe; adjust as needed. P-1
8. Center steering wheel. P-1
9. Check toe-out-on-turns (turning radius); determine necessary action. P-2
10. Check SAI (steering axis inclination) and included angle; determine necessary action. P-2
11. Check and adjust rear wheel toe. P-2
12. Check rear wheel thrust angle; determine necessary action. P-2

- |     |                                                                      |     |
|-----|----------------------------------------------------------------------|-----|
| 13. | Check for front wheel setback; determine necessary action.           | P-2 |
| 14. | Check front cradle (subframe) alignment; determine necessary action. | P-3 |

#### IV. SUSPENSION AND STEERING

##### E. Wheel and Tire Diagnosis and Repair

- |     |                                                                               |     |
|-----|-------------------------------------------------------------------------------|-----|
| 1.  | Diagnose tire wear patterns; determine necessary action.                      | P-1 |
| 2.  | Inspect tires; check and adjust air pressure.                                 | P-1 |
| 3.  | Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. | P-2 |
| 4.  | Rotate tires according to manufacturer's recommendations.                     | P-1 |
| 5.  | Measure wheel, tire, axle, and hub runout; determine necessary action.        | P-2 |
| 6.  | Diagnose tire pull (lead) problem; determine necessary action.                | P-2 |
| 7.  | Balance wheel and tire assembly (static and dynamic).                         | P-1 |
| 8.  | Dismount, inspect, repair, and remount tire on wheel.                         | P-2 |
| 9.  | Reinstall wheel; torque lug nuts.                                             | P-1 |
| 10. | Inspect and repair tire.                                                      | P-2 |

## BRAKES

**For every task in Brakes, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

#### V. BRAKES

##### A. General Brake Systems Diagnosis

- |    |                                                                          |     |
|----|--------------------------------------------------------------------------|-----|
| 1. | Identify and interpret brake system concern; determine necessary action. | P-1 |
|----|--------------------------------------------------------------------------|-----|

2. Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins. P-1

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

### **B. Hydraulic System Diagnosis and Repair**

1. Diagnose pressure concerns in the brake system using hydraulic principles (Paschal's Law). P-1

2. Measure brake pedal height; determine necessary action. P-2

3. Check master cylinder for internal and external leaks and proper operation; determine necessary action. P-2

4. Remove, bench bleed, and reinstall master cylinder. P-1

5. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action. P-1

6. 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

7. Fabricate and/or install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed. P-2

8. Select, handle, store, and fill brake fluids to proper level. P-1

9. Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. P-2

10. Inspect, test, and adjust height (load) sensing proportioning valve. P-3

11. Inspect, test, and/or replace components of brake warning light system. P-3

12. Bleed (manual, pressure, vacuum or surge) brake system. P-1

13. Flush hydraulic system. P-3

## V. BRAKES

### C. Drum Brake Diagnosis and Repair

1. Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1
2. Remove, clean (using proper safety procedures), inspect, and measure brake drums; determine necessary action. P-1
3. Refinish brake drum. P-1
4. 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-1
5. Remove, inspect, and install wheel cylinders. P-2
6. Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings. P-1
7. Install wheel, torque lug nuts, and make final checks and adjustments. P-1

## V. BRAKES

### D. Disc Brake Diagnosis and Repair

1. Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1
2. Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action. P-1
3. Clean and inspect caliper mounting and slides for wear and damage; determine necessary action. P-1
4. Remove, clean, and inspect pads and retaining hardware; determine necessary action. P-1
5. Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. P-2
6. Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks. P-1

- 7. 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
- 8. Remove and reinstall rotor. P-1
- 9. Refinish rotor according to manufacturer's recommendations. P-1
- 10. Adjust calipers equipped with an integrated parking brake system. P-3
- 11. Install wheel, torque lug nuts, and make final checks and adjustments. P-1

**V. BRAKES**

**E. Power Assist Units Diagnosis and Repair**

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

**V. BRAKES**

**F. Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.)  
Diagnosis and Repair**

- 1. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. P-1
- 2. Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings. P-1
- 3. Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, or replace as needed. P-2
- 4. Check parking brake operation; determine necessary action. P-1
- 5. Check operation of parking brake indicator light system. P-3

- 6. Check operation of brake stop light system; determine necessary action. P-1
- 7. Replace wheel bearing and race. P-1
- 8. Inspect and replace wheel studs. P-1
- 9. Remove and reinstall sealed wheel bearing assembly. P-2

**V. BRAKES**

**G. Antilock Brake and Traction Control Systems**

- 1. Identify and inspect antilock brake system (ABS) components; determine necessary action. P-1
- 2. Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise concerns caused by the antilock brake system (ABS); determine necessary action. P-2
- 3. Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action. P-1
- 4. Depressurize high-pressure components of the antilock brake system (ABS). P-3
- 5. Bleed the antilock brake system's (ABS) front and rear hydraulic circuits. P-2
- 6. Remove and install antilock brake system (ABS) electrical/electronic and hydraulic components. P-3
- 7. Test, diagnose and service ABS speed sensors, toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data). P-1
- 8. Diagnose antilock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.). P-3
- 9. Identify traction control system components. P-3

## ELECTRICAL/ELECTRONIC SYSTEMS

For every task in Electrical/Electronic Systems, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

### VI. ELECTRICAL/ELECTRONIC SYSTEMS

#### A. General Electrical System Diagnosis

1. Identify and interpret electrical/electronic system concern; determine necessary action. P-1
2. Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. P-1
3. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). P-1
4. Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law). P-1
5. Use wiring diagrams during diagnosis of electrical circuit problems. P-1
6. Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems. P-1
7. Check electrical circuits with a test light; determine necessary action. P-2
8. Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action. P-1
9. Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action. P-1
10. Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action. P-1

- 11. Check electrical circuits using fused jumper wires; determine necessary action. P-2
- 12. Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. P-1
- 13. Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action. P-1
- 14. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. P-1
- 15. Inspect and test switches, connectors, relays, solid state devices, and wires of electrical/electronic circuits; perform necessary action. P-1
- 16. Repair wiring harnesses and connectors. P-1
- 17. Perform solder repair of electrical wiring. P-1

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**B. Battery Diagnosis and Service**

- 1. Perform battery state-of-charge test; determine necessary action. P-1
- 2. Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action. P-1
- 3. Maintain or restore electronic memory functions. P-1
- 4. Inspect, clean, fill, and replace battery. P-2
- 5. Perform slow/fast battery charge. P-2
- 6. Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed. P-1
- 7. Start a vehicle using jumper cables and a battery or auxiliary power supply. P-1

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**C. Starting System Diagnosis and Repair**

- 1. Perform starter current draw tests; determine necessary action. P-1

2. Perform starter circuit voltage drop tests; determine necessary action. P-1
3. Inspect and test starter relays and solenoids; determine necessary action. P-2
4. Remove and install starter in a vehicle. P-1
5. Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action. P-2
6. Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition. P-2

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**D. Charging System Diagnosis and Repair**

1. Perform charging system output test; determine necessary action. P-1
2. Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions. P-1
3. Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment. P-2
4. Remove, inspect, and install generator (alternator). P-1
5. Perform charging circuit voltage drop tests; determine necessary action. P-1

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**E. Lighting Systems Diagnosis and Repair**

1. Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action. P-1
2. Inspect, replace, and aim headlights and bulbs. P-2
3. Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. P-2

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**F. Gauges, Warning Devices, and Driver Information Systems  
Diagnosis and Repair**

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

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**G. Horn and Wiper/Washer Diagnosis and Repair**

1. Diagnose incorrect horn operation; perform necessary action. P-2
2. Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. P-2
3. Diagnose incorrect washer operation; perform necessary action. P-2

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**H. Accessories Diagnosis and Repair**

1. Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. P-2
2. Diagnose incorrect heated glass operation; determine necessary action. P-3
3. Diagnose incorrect electric lock operation; determine necessary action. P-2
4. Diagnose incorrect operation of cruise control systems; determine necessary action. P-3
5. Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (Note: Follow manufacturer's safety procedures to prevent accidental deployment.) P-2
6. Disarm and enable the airbag system for vehicle service. P-1

- |     |                                                                                                  |     |
|-----|--------------------------------------------------------------------------------------------------|-----|
| 7.  | Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action. | P-3 |
| 8.  | Remove and reinstall door panel.                                                                 | P-1 |
| 9.  | Diagnose body electronic system circuits using a scan tool; determine necessary action.          | P-2 |
| 10. | Check for module communication errors using a scan tool.                                         | P-3 |
| 11. | Diagnose the cause of false, intermittent, or no operation of anti-theft system.                 | P-2 |

## HEATING AND AIR CONDITIONING

**For every task in Heating and Air Conditioning, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### VII. HEATING AND AIR CONDITIONING

#### A. A/C System Diagnosis and Repair

- |    |                                                                                                                                                                                            |     |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Identify and interpret heating and air conditioning concern; determine necessary action.                                                                                                   | P-1 |
| 2. | Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 3. | Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).                                                           | P-1 |
| 4. | Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration.                                                                                           | P-1 |
| 5. | Diagnose abnormal operating noises in the A/C system; determine necessary action.                                                                                                          | P-2 |

- |    |                                                                                                      |     |
|----|------------------------------------------------------------------------------------------------------|-----|
| 6. | Identify refrigerant type; conduct a performance test of the A/C system; determine necessary action. | P-1 |
| 7. | Leak test A/C system; determine necessary action.                                                    | P-1 |
| 8. | Inspect the condition of discharged oil; determine necessary action.                                 | P-2 |
| 9. | Determine recommended oil for system application.                                                    | P-1 |

**VII. HEATING AND AIR CONDITIONING**

**B. Refrigeration System Component Diagnosis and Repair**

**1. Compressor and Clutch**

- |    |                                                                                                                                                          |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. | P-2 |
| 2. | Inspect A/C compressor drive belts; determine necessary action.                                                                                          | P-2 |
| 3. | Inspect, test, and/or replace A/C compressor clutch components and/or assembly.                                                                          | P-2 |
| 4. | Remove and reinstall A/C compressor and mountings; measure oil quantity; determine necessary action.                                                     | P-1 |

**2. Evaporator, Condenser, and Related Components**

- |    |                                                                                                                               |     |
|----|-------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Determine need for an additional A/C system filter; perform necessary action.                                                 | P-3 |
| 2. | Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action. | P-2 |
| 3. | Inspect A/C condenser for airflow restrictions; perform necessary action.                                                     | P-1 |
| 4. | Remove and reinstall receiver/drier or accumulator/drier; measure oil quantity; determine necessary action.                   | P-1 |
| 5. | Remove and install expansion valve or orifice (expansion) tube.                                                               | P-2 |
| 6. | Inspect evaporator housing water drain; perform necessary action.                                                             | P-3 |

- 7. Remove and reinstall evaporator; measure oil quantity; determine necessary action. P-3
- 8. Remove and reinstall condenser; measure oil quantity; determine necessary action. P-3

**VII. HEATING AND AIR CONDITIONING**

**C. Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair**

- 1. Diagnose temperature control problems in the heater/ventilation system; determine necessary action. P-2
- 2. Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action. P-1
- 3. Inspect engine cooling and heater system hoses and belts; perform necessary action. P-1
- 4. Inspect, test, and replace thermostat and housing. P-1
- 5. Determine coolant condition and coolant type for vehicle application; drain and recover coolant. P-1
- 6. Flush system; refill system with recommended coolant; bleed system. P-1
- 7. Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action. P-1
- 8. Inspect and test electric cooling fan, fan control system and circuits; determine necessary action. P-1
- 9. Inspect and test heater control valve(s); perform necessary action. P-2
- 10. Remove and reinstall heater core. P-3

**VII. HEATING AND AIR CONDITIONING**

**D. Operating Systems and Related Controls Diagnosis and Repair**

- 1. Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action. P-2

- |    |                                                                                                                                                            |     |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 2. | Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.                         | P-1 |
| 3. | Test and diagnose A/C compressor clutch control systems; determine necessary action.                                                                       | P-1 |
| 4. | Diagnose malfunctions in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. | P-2 |
| 5. | Inspect and test A/C-heater control panel assembly; determine necessary action.                                                                            | P-3 |
| 6. | Inspect and test A/C-heater control cables and linkages; perform necessary action.                                                                         | P-3 |
| 7. | Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.                                                               | P-3 |
| 8. | Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.             | P-3 |

**VII. HEATING AND AIR CONDITIONING**

**E. Refrigerant Recovery, Recycling, and Handling**

- |    |                                                                                                        |     |
|----|--------------------------------------------------------------------------------------------------------|-----|
| 1. | Perform correct use and maintenance of refrigerant handling equipment.                                 | P-1 |
| 2. | Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant. | P-1 |
| 3. | Recycle refrigerant.                                                                                   | P-1 |
| 4. | Label and store refrigerant.                                                                           | P-1 |
| 5. | Test recycled refrigerant for non-condensable gases.                                                   | P-1 |
| 6. | Evacuate and charge A/C system.                                                                        | P-1 |

## ENGINE PERFORMANCE

For every task in Engine Performance 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

### VIII. ENGINE PERFORMANCE

#### A. General Engine Diagnosis

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

- |     |                                                                                                                                                                      |     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 11. | Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action. | P-1 |
| 12. | Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.                  | P-1 |
| 13. | Verify engine operating temperature; determine necessary action.                                                                                                     | P-1 |
| 14. | Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. | P-1 |
| 15. | Verify correct camshaft timing.                                                                                                                                      | P-2 |

## VIII. ENGINE PERFORMANCE

### B. Computerized Engine Controls Diagnosis and Repair

- |    |                                                                                                                                                                                                                       |     |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Retrieve and record stored OBD I diagnostic trouble codes; clear codes.                                                                                                                                               | P-2 |
| 2. | Retrieve and record stored OBD II diagnostic trouble codes; clear codes.                                                                                                                                              | P-1 |
| 3. | Diagnose the causes of emissions or driveability concerns resulting from malfunctions in the computerized engine control system with stored diagnostic trouble codes.                                                 | P-1 |
| 4. | Diagnose emissions or driveability concerns resulting from malfunctions in the computerized engine control system with no stored diagnostic trouble codes; determine necessary action.                                | P-1 |
| 5. | Check for module communication errors using a scan tool.                                                                                                                                                              | P-2 |
| 6. | Inspect and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action. | P-1 |
| 7. | Obtain and interpret scan tool data.                                                                                                                                                                                  | P-1 |
| 8. | Access and use service information to perform step-by-step diagnosis.                                                                                                                                                 | P-1 |

9. Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action. P-3

## VIII. ENGINE PERFORMANCE

### C. Ignition System Diagnosis and Repair

1. Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action. P-1
2. Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action. P-1
3. Inspect and test ignition primary circuit wiring and solid state components; perform necessary action. P-2
4. Inspect, test and service distributor. P-3
5. Inspect and test ignition system secondary circuit wiring and components; perform necessary action. P-2
6. Inspect and test ignition coil(s); perform necessary action. P-1
7. Check and adjust ignition system timing and timing advance/retard (where applicable). P-3
8. Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action. P-1

## VIII. ENGINE PERFORMANCE

### D. Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

1. Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor-type fuel systems; determine necessary action. P-3

- |     |                                                                                                                                                                                                                                                                                                     |     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 2.  | Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine necessary action. | P-1 |
| 3.  | Check fuel for contaminants and quality; determine necessary action.                                                                                                                                                                                                                                | P-3 |
| 4.  | Inspect and test mechanical and electrical fuel pumps and pump control systems for pressure, regulation and volume; perform necessary action.                                                                                                                                                       | P-1 |
| 5.  | Replace fuel filters.                                                                                                                                                                                                                                                                               | P-1 |
| 6.  | Inspect and test cold enrichment system and components; perform necessary action.                                                                                                                                                                                                                   | P-3 |
| 7.  | Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.                                                                                                                                                                                     | P-2 |
| 8.  | Inspect and test fuel injectors.                                                                                                                                                                                                                                                                    | P-2 |
| 9.  | Check idle speed and fuel mixture.                                                                                                                                                                                                                                                                  | P-2 |
| 10. | Adjust idle speed and fuel mixture.                                                                                                                                                                                                                                                                 | P-3 |
| 11. | Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.                                                                                                                         | P-2 |
| 12. | Perform exhaust system back-pressure test; determine necessary action.                                                                                                                                                                                                                              | P-1 |
| 13. | Test the operation of turbocharger/supercharger systems; determine necessary action                                                                                                                                                                                                                 | P-3 |

## **VIII. ENGINE PERFORMANCE**

### **E. Emissions Control Systems Diagnosis and Repair**

#### **1. Positive Crankcase Ventilation**

- |    |                                                                                                                                                                      |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Diagnose oil leaks, emissions, and driveability problems resulting from malfunctions in the positive crankcase ventilation (PCV) system; determine necessary action. | P-2 |
| 2. | Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.                     | P-2 |

## 2. Exhaust Gas Recirculation

1. Diagnose emissions and driveability problems caused by malfunctions in the exhaust gas recirculation (EGR) system; determine necessary action. P-1
2. Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action. P-2
3. Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action. P-2

## 3. Exhaust Gas Treatment

1. Diagnose emissions and driveability problems resulting from malfunctions in the secondary air injection and catalytic converter systems; determine necessary action. P-2
2. Inspect and test mechanical components of secondary air injection systems; perform necessary action. P-3
3. Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. P-3
4. Inspect and test catalytic converter performance. P-1

## 4. Intake Air Temperature Controls

1. Diagnose emissions and driveability problems resulting from malfunctions in the intake air temperature control system; determine necessary action. P-3
2. Inspect and test components of intake air temperature control system; perform necessary action. P-3

## 5. Early Fuel Evaporation (Intake Manifold Temperature) Controls

1. Diagnose emissions and driveability problems resulting from malfunctions in the early fuel evaporation control system; determine necessary action. P-3
2. Inspect and test components of early fuel evaporation control system; perform necessary action. P-3

## 6. Evaporative Emissions Controls

- |    |                                                                                                                                                   |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Diagnose emissions and driveability problems resulting from malfunctions in the evaporative emissions control system; determine necessary action. | P-1 |
| 2. | Inspect and test components and hoses of evaporative emissions control system; perform necessary action.                                          | P-2 |
| 3. | Interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action.                                               | P-1 |

**VIII. ENGINE PERFORMANCE**

**F. Engine Related Service**

- |    |                                                                                                                                           |     |
|----|-------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. | Adjust valves on engines with mechanical or hydraulic lifters.                                                                            | P-1 |
| 2. | Remove and replace timing belt; verify correct camshaft timing.                                                                           | P-1 |
| 3. | Remove and replace thermostat.                                                                                                            | P-2 |
| 4. | Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. | P-1 |

## Task List Priority Item Totals (by area)

I. Engine Repair	V. Brakes
P-1 = 20	P-1 = 32
P-2 = 25	P-2 = 14
P-3 = 11	P-3 = 10
II. Automatic Transmission and Transaxle	VI. Electrical/Electronic Systems
P-1 = 19	P-1 = 32
P-2 = 19	P-2 = 19
P-3 = 6	P-3 = 5
III. Manual Drive Train and Axles	VII. Heating and Air Conditioning
P-1 = 21	P-1 = 25
P-2 = 24	P-2 = 11
P-3 = 19	P-3 = 9
IV. Suspension and Steering	VIII. Engine Performance
P-1 = 28	P-1 = 32
P-2 = 25	P-2 = 19
P-3 = 11	P-3 = 14

**SCHOOL Lewis & Clark Career Center**

Core Data

9/25/2002

<b>PROGRAM</b>	<b>AM</b>	<b>PM</b>	<b>XD</b>	<b>TOTAL</b>
Auto Collision Repair	16	16	16	48
Auto Service Technology I	16	16		32
Auto Service Technology II	15	14	15	44
Brick & Stone Masonry	15	16		31
Building Trades	17	16		33
Computer Information Systems	17	16		33
Computer Maintenance Technology	17	16		33
Data Management	10	15		25
Design Drafting	18	14		32
Electrical Trades	15	16		31
Health Occupations	15	14		29
Health Related Occupations	14	12		26
Heating/Ventilation/AC	16	10		26
Lawn & Garden	13	16		29
Supermarket Careers	12	12		24
Welding	15	14		29
<b>TOTAL</b>	<b>241</b>	<b>233</b>	<b>31</b>	<b>505</b>

Total Instructional Time and Lecture / Hands-on Ratio  
 Lewis and Clark Career Center  
 Auto Service Technology

ASE Area                      Total              % of Total Time              Lecture              Hands On

Electrical/ Electronics	200	19	60	40
Engine Repair	120	11	40	60
Automatic Transmission	120	11	50	50
Manual Drive Line	100	9	50	50
Suspension and Steering	100	9	40	60
Brakes	100	9	45	55
Heating and A/C	80	8	40	60
Engine Performance	260	24	50	50

# Automotive Technology

*Cross-Reference to Show-Me Standards (main report)*

NOTE: The cross-reference between Missouri competencies and current ASE tasks can be found on the Automotive Technology competency profile available from the Instructional Materials Laboratory, catalog #70-1800-C. \*NOTE: These competencies are addressed in the Missouri VICA Curriculum Guide lessons.

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
A1	SC.8	1.7			SC/VIII.B/9-12/1/a		HP/II.A/9-12/1/a	
A2	MA.1 MA.2 MA.3 MA.6 SC.2	3.3	MA/II./9-12/1/c MA/VII./9-12/2/i MA/VIII./9-12/5/a MA/X./9-12/4/a		SC/IV.B/9-12/1/a SC/IV.B/9-12/2/a SC/IV.C/9-12/1/a SC/IV.C/9-12/2/a			
A3	MA.1 SC.2	3.3	MA/II./9-12/1/c		SC/IV.B/9-12/2/a SC/IV.C/9-12/2/a			
A4	HP.3 HP.7	4.6 4.7					HP/III.A/9-12/1/a	
A5	HP.3	4.7					HP/III.D/9-12/1/a	
A6	SC.2	3.2 3.3			SC/IV.C/9-12/1/a SC/IV.C/9-12/2/a			
A7	SC.8	4.7			SC/VIII.B/9-12/1/a			
B1	CA.1	2.3		CA/II./9-12/3/b				
B2	MA.1	3.1	MA/II./9-12/4/e					
B3	CA.3	1.10		CA/III./9-12/3/b				
B4	HP.2	4.7					HP/II.D/9-12/1/b	
C1	SC.1	1.6			SC/II.A/9-12/4/a			
C2	SS.4	4.8				SS/IV.D/9-12/1/h		
D1	CA.3 MA.1 SC.1	1.1 3.1	MA/II./9-12/4/d MA/II./9-12/3/h	CA/III./9-12/1/a CA/III./9-12/1/d CA/III./9-12/1/i	SC/II.A/9-12/4/a			
D2	SC.1	3.1			SC/II.A/9-12/4/a			
D3	SC.1	3.1			SC/II.A/9-12/4/a			
D4	SC.1	3.1			SC/II.A/9-12/4/a			
D5	SC.1	3.1			SC/II.A/9-12/4/a			

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# Automotive Technology

Cross-Reference to Show-Me Standards (main report)

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
E1	HP.1 SC.1	3.2 4.7			SC/III.B/9-12/4/a		HP/II.A/9-12/1/a	
E2	SC.1	3.1			SC/III.A/9-12/3/a			
E3	HP.7 SC.1	3.2 4.7			SC/III.C/9-12/1/a			
E4	SC.1	3.2 4.7			SC/III.A/9-12/3/a			
F1	CA.3 MA.1	1.7 4.1 4.7	MA/II./9-12/4/c	CA/III./9-12/1/a CA/III./9-12/1/d CA/III./9-12/1/e				
F2	CA.3	4.5 4.7		CA/III./9-12/1/i				
F3	CA.3	3.2		CA/III./9-12/1/j				
G1	CA.3 MA.1	4.1 4.7	MA/II./9-12/4/c	CA/III./9-12/1/a CA/III./9-12/1/d CA/III./9-12/1/g CA/III./9-12/1/i				
G2	CA.3	4.1		CA/III./9-12/1/a CA/III./9-12/1/d CA/III./9-12/1/i				
G3	CA.3	4.1		CA/II./9-12/98/#				
G4	CA.3	4.1		CA/II./9-12/98/#				
H1	CA.3	4.1		CA/III./9-12/1/a CA/III./9-12/1/d CA/III./9-12/1/i				
H2	CA.3	4.1		CA/II./9-12/98/#				
I1	CA.3	4.1		CA/III./9-12/1/a				
I2	CA.3	4.1		CA/III./9-12/1/a CA/III./9-12/1/i				
J1	CA.3	3.1	MA/VIII./9-12/4/a		SC/II.A/9-12/1/a			

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# Automotive Technology

Cross-Reference to Show-Me Standards (main report)

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
J2	MA.3	3.2			SC/IV/B/9-12/3/a			
	SC.2	3.7						
	SC.7	4.1						
J3	MA.1	3.1	MA/V../9-12/3/b		SC/IV/B/9-12/3/a			
	MA.2	3.3	MA/VII../9-12/5/a					
	SC.2	4.4						
J4	MA.1	3.1	MA/V../9-12/3/b		SC/IV/B/9-12/3/a			
	MA.2	3.3	MA/VII../9-12/5/a					
	SC.2	4.4						
J5	CA.3	3.1	MA/VII../9-12/4/a		SC/IA/9-12/1/a			
	MA.3	3.2			SC/IV/B/9-12/3/a			
	SC.2	3.7						
J6	SC.7	4.1						
	MA.1	3.1	MA/V../9-12/3/b		SC/IV/B/9-12/3/a			
	MA.2	3.3	MA/VII../9-12/5/a					
K1	SC.2	4.4						
	CA.3	1.2	MA/II../9-12/4/c	CA/III../9-12/4/f	SC/IA/9-12/4/a		HP/II/A/9-12/2/a	
	HP.6	3.1			SC/IV/A/9-12/3/b			
K2	MA.1	3.2						
	SC.1	3.1						
	SC.1	3.2						
K3	CA.3	1.2	MA/II../9-12/4/c	CA/III../9-12/4/f	SC/IA/9-12/4/a			
	MA.1	3.1						
	SC.1	3.2						
K4	MA.1	1.2	MA/II../9-12/4/c		SC/IA/9-12/4/a			
	SC.1	3.1						
K5	CA.3	1.2	MA/II../9-12/4/c	CA/III../9-12/4/f	SC/IA/9-12/4/a			

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# Automotive Technology

Cross-Reference to Show-Me Standards (main report)

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
K6	MA.1	1.2	MA/I./9-12/4/c		SC/IIA/9-12/4/a			
	SC.1	3.1						
K7	MA.1	1.2	MA/I./9-12/4/c		SC/IIA/9-12/4/a			
	SC.1	3.1						
K8	MA.1	3.1	MA/I./9-12/4/c		SC/IIA/9-12/4/a			
	SC.2							
L1	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
L2	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
L3	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
L4	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
L5	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
L6	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
L7	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
L8	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
L9	CA.3	1.10		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						
M1	CA.3	3.1	MA/I./9-12/4/c	CA/III./9-12/1/d	SC/IIA/9-12/4/a			
	MA.3	3.2						
	SC.7	3.3						
M2	HP.6	4.5					HP/III.A/9-12/1/a	
N1	CA.3	1.1		CA/III./9-12/1/a	SC/VIII.B/9-12/1/a			
	SC.7	3.2						

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# Automotive Technology

Cross-Reference to Show-Me Standards (main report)

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
N2	CA.3 SC.7	1.1 3.2		CA / III. / 9-12/1/a	SC / VIII. B / 9-12/1/a			
N3	CA.3 SC.7	1.1 3.2		CA / III. / 9-12/1/a	SC / VIII. B / 9-12/1/a			
N4	CA.3 SC.7	1.1 3.2		CA / III. / 9-12/1/a	SC / VIII. B / 9-12/1/a			
O1	CA.3	3.2		CA / III. / 9-12/1/a				
O2	MA.1	3.1	MA / I. / 9-12/4/c					
O3	MA.1	3.1	MA / I. / 9-12/4/c					
O4	MA.1	3.1	MA / I. / 9-12/4/c					
O5	CA.3	3.2		CA / III. / 9-12/1/a				
O6	CA.3	3.2		CA / III. / 9-12/1/a				
P1	CA.3	3.2		CA / III. / 9-12/1/a				
P2	CA.3	3.2		CA / III. / 9-12/1/a				
Q1	SC.2	3.2			SC / I. A / 9-12/4/a			
Q2	CA.1 MA.1 SC.2	1.4 1.8 3.1	MA / V. / 9-12/3/a					
Q3	SC.3	3.2			SC / I. A / 9-12/4/a			
Q4	SC.2	3.2			SC / I. A / 9-12/4/a			
Q5	SC.2	3.2			SC / I. A / 9-12/4/a			
Q6	SC.2	3.2			SC / I. A / 9-12/4/a			
R1	CA.1 MA.1 SC.2	1.4 1.8 3.1	MA / V. / 9-12/3/a		SC / I. A / 9-12/4/a			
R2	SC.2	3.2			SC / I. A / 9-12/4/a			
R3	CA.1 MA.1	1.4 1.8	MA / V. / 9-12/3/a					

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# Automotive Technology

Cross-Reference to Show-Me Standards (main report)

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
R.4	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
R.5	CA.1 MA.1	1.4 1.8	MA / V.. / 9-12 / 3 / a					
R.6	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
R.7	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
R.8	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
S.1	MA.1	3.1			SC / I.A / 9-12 / 4 / a			
S.2	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
S.3	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
S.4	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
S.5	CA.1 MA.1 SC.2	1.4 1.8 3.1	MA / V.. / 9-12 / 3 / a		SC / I.A / 9-12 / 4 / a			
S.6	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
T.1	CA.1 MA.1 SC.2	1.4 1.8 3.1	MA / V.. / 9-12 / 3 / a		SC / I.A / 9-12 / 4 / a			
T.2	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
T.3	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
T.4	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
U.1	CA.1 CA.3 MA.1 SC.2 SS.4	1.4 1.8 3.1 3.2 4.4	MA / V.. / 9-12 / 3 / a	CA / I.. / 9-12 / 2 / d	SC / I.A / 9-12 / 4 / a	SS / II.D / 9-12 / 4 / j		
U.2	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
U.3	SC.2	3.2			SC / I.A / 9-12 / 4 / a			
U.4	SC.2	3.2			SC / I.A / 9-12 / 4 / a			

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# Automotive Technology

Cross-Reference to Show-Me Standards (main report)

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
V 1	CA.1	1.4	MA/V../9-12/3/a		SC/1A/9-12/4/a			
	MA.1	1.8						
	SC.2	3.1						
V 2	SC.2	3.2			SC/1A/9-12/4/a			
V 3	SC.2	3.2			SC/1A/9-12/4/a			
W 1								
W 2								
W 3								
X 1	CA.1	1.4	MA/V../9-12/3/a		SC/1A/9-12/4/a			
	MA.1	1.8						
	SC.2	3.1						
X 2	SC.2	3.2			SC/1A/9-12/4/a			
X 3	SC.2	3.2			SC/1A/9-12/4/a			
Y 1	CA.1	1.4	MA/V../9-12/3/a		SC/1A/9-12/4/a			
	MA.1	1.8						
	SC.2	3.1						
Y 2	SC.2	3.2			SC/1A/9-12/4/a			
Y 3	SC.2	3.2			SC/1A/9-12/4/a			
Y 4	CA.1	1.4	MA/V../9-12/3/a		SC/1A/9-12/4/a			
	MA.1	1.8						
	SC.2	3.2						
Z 1	CA.1	1.4	MA/V../9-12/3/a		SC/1A/9-12/4/a			
	MA.1	1.8						
	SC.2	3.2						
Z 2	SC.2	3.2			SC/1A/9-12/4/a			
Za 1	CA.1	1.4	MA/V../9-12/3/a	CA/1../9-12/2/d	SC/1A/9-12/4/a			SS/11D/9-12/4/1
	CA.3	1.8						
	MA.1	3.1						
	SC.2	3.2						
	SS.4	4.4						

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# Automotive Technology

Cross-Reference to Show-Me Standards (main report)

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
Za2	SC2	32			SC/1A/9-12/4/a			
Za3	SC2	32			SC/1A/9-12/4/a			
Zb1	SC2	31			SC/1A/9-12/4/a			
Zb2	SC2	31			SC/1A/9-12/4/a			
Zb3	SC2	31			SC/1A/9-12/4/a			
Zc1	CA.1 MA.1 SC.2	1.4 1.8 3.2	MA/V../9-12/3/a		SC/1A/9-12/4/a			
Zc2	SC2	31			SC/1A/9-12/4/a			
Zc3	SC2	31			SC/1A/9-12/4/a			
Zd1	CA.1 MA.1 SC.2	1.4 1.8 3.2	MA/V../9-12/3/a		SC/1A/9-12/4/a			
Zd2	SC2	31			SC/1A/9-12/4/a			
Zd3	SC2	32			SC/1A/9-12/4/a			
Zd4	SC2	32			SC/1A/9-12/4/a			
Zd5	SC2	32			SC/1A/9-12/4/a			
Zd6	SC2	32			SC/1A/9-12/4/a			
Ze1	CA.1 CA.3 MA.1 SC.2 SS.4	1.4 1.8 3.1 3.2 4.4	MA/V../9-12/3/a	CA/L../9-12/2/d	SC/1A/9-12/4/a	SS/11/D/9-12/4/j		
Ze2								
Ze3								
Ze4								
Ze5								
Zf1	SC2	31			SC/1A/9-12/4/a			

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# Automotive Technology

Cross-Reference to Show-Me Standards (main report)

Duty Band and Task Statement	Knowledge (Content)	Performance (Goals)	Math	Communication Arts	Science	Social Studies	Health / Physical Education	Fine Arts
Zf.2	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zf.3	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zf.4	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zf.5	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zg.1	CA.3 HP.6 MA.1 SC.1 SC.2 SC.8 SS.4	1.4 3.1 3.2 3.5 4.4 4.7	MA / V.. / 9-12 / 3 / a	CA / I.. / 9-12 / 2 / d	SC / I.A / 9-12 / 4 / a SC / III.B / 9-12 / 2 / a SC / VI.A / 9-12 / 2 / a	SS / II.D / 9-12 / 4 / j	HP / III.D / 9-12 / 2 / a	
Zg.2	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zg.3	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zg.4	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zh.1	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zh.2	SC.2	3.1			SC / I.A / 9-12 / 4 / a			
Zi.1	SS.6	4.3				SS / II.B / 9-12 / 5 / l		
Zi.2	SS.6	4.4				SS / II.B / 9-12 / 4 / l		
Zi.3	HP.2	4.7					HP / II.A / 5-8 / 1 / b	
Zi.4	CA.6	2.3		CA / II.. / 9-12 / 5 / b CA / II.. / 9-12 / 5 / c				
Zi.5	CA.6	2.3		CA / II.. / 9-12 / 5 / c				
Zi.6	CA.1	2.1		CA / II.. / 9-12 / 3 / c				
Zi.7	SS.6	4.4				SS / II.B / 9-12 / 4 / m		
Zi.8	HP.2	4.7					HP / II.A / 9-12 / 5 / a	
Zi.9	SS.4	4.8				SS / II.D / 9-12 / 5 / n		
Zi.10	SS.4	4.3				SS / II.B / 9-12 / 5 / n		

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# LEWIS & CLARK CAREER CENTER

## EARN COLLEGE CREDIT

Lewis & Clark students who qualify may be able to earn college credit hours or advanced standing with the following institutions. Students must meet eligibility requirements set by the post-secondary institution or apprenticeship program. Arrangements must be made through Lewis & Clark and the cooperating institution or apprenticeship program.

See your instructor or counselor.

<u>PROGRAM</u>	<u>INSTITUTION</u>	<u>HOURS</u>
Auto Collision.....	Ranken .....	10
Auto Service Technology.....	St. Louis Community College (Forest Park) .....	9
	Ranken .....	10
	Linn State Technical College.....	8-9
Brick & Stone Masonry.....	Construction Craft Laborer Apprenticeship .....	Advanced Standing
Building Trades.....	Associated General Contractors of St. Louis .....	Advanced Standing
	Construction Craft Laborer Apprenticeship .....	Advanced Standing
	Floor Layers Apprenticeship .....	Advanced Standing
	East Central Community College .....	21
	Ranken .....	10
Computer Information Systems .....	St. Charles Community College.....	Credit by Exam
	Ranken .....	10
	Linn State Technical College.....	6
Computer Maintenance Technology .....	Linn State Technical College.....	Credit by Exam or Computer Certification
Data Management .....	St. Charles Community College.....	6
	.....	Additional Credit Subject to Exam
Design Drafting/CAD .....	East Central Community College .....	27
	Ranken .....	14
	Linn State Technical College:	
	..... (Drafting).....	21
	..... (Civil/Construction Engineering) .....	3
	St. Charles Community College.....	5
Electrical Trades .....	Ranken .....	10
	Construction Craft Laborer Apprenticeship .....	Advanced Standing
HVAC .....	East Central Community College .....	19
	Ranken .....	15
	Linn State Technical College.....	11
Lawn & Garden Equip. Repair.....	Construction Craft Laborer Apprenticeship .....	Advanced Standing
Welding.....	Construction Craft Laborer Apprenticeship .....	Advanced Standing
	Linn State Technical College .....	3

**PROGRAM ARTICULATION AGREEMENT  
FOR  
THE TECHNICAL CAREER PATHWAYS PROGRAM  
*Lewis and Clark Vocational School***

All credit is awarded on the basis that students have successfully completed the prerequisites for each course. Students are to provide competencies of their vocational technical program as well of letters of recommendation to accompany their petition for credit. All credit which is to be awarded is subject to: possessing the required number of competencies; receiving favorable letters of recommendations (to include comments about work ethic, attendance, interpersonal communication, appearance, motivation, industriousness; passing a written and performance examination covering the competencies which are part of the Ranken Technical College course.

The first term or semester of technical courses listed below will be articulated based upon successful completion of a 2 year program at a vocational technical school, favorable letters of recommendation (to cover our work ethic component), possessing the required number of competencies and a proficiency test (written and performance) given by Ranken Technical College with a grade of "B" or higher: The written test for all eligible programs\* must be completed successfully before the performance testing will be administered.

<u>Lewis &amp; Clark Program Title</u>	<u>Ranken Course Title</u>	<u>Credit Hours</u>
Design Drafting/CAD	1st semester, Architectural Technology	14
Auto Collision Repair	1st term, Automotive Collision Repair	10
Auto Service Technology	1st term, Automotive Maintenance Technology	10
Building Trades	1st term, Carpentry and Building Construction	10
Electrical Trades	1st term, Industrial Electricity/Electronics Technology	10
Electronics	1st term, Electronics Engineering Technology	10
Heating, Ventilation, and Air Conditioning (HVAC)	1st semester, Refrigeration/Air Conditioning/Heating	15
Computer Information Systems	1st term Computer Networking Technology	10

\*Some technical programs may be excluded from the articulation agreement.

*Kenneth C. Cobb*  
Signature  
*Voc Director*  
Title  
*11-2-98*  
Date

*Debra R. McPeak*  
Signature  
*Dean*  
Title

Debra R. McPeak, Ph.D, Dean of Enrollment Services  
Ranken Technical College





**ARTICULATION ARTICLES OF AGREEMENT**

**AMENDMENT NO. 092-090-001**

<u>Automotive Technology</u>	College Program
<u>Automotive Technology</u>	High School Area of Discipline
<u>Lewis &amp; Clark Career Center</u>	High School or School District

Defined equivalence recognized through Tech Prep relationship:

High School Course Work

Automotive Mechanics I  
and  
Automotive Mechanics II

College Course Work

AUT:151 Automotive Engine Operation (3 cr hr)  
and  
AUT:156 Automotive Electricity (3 cr hr)  
and  
AUT:168 Suspension & Steering I (3 cr hr)

**This agreement does not include the Ford ASSET program.**

**Standards for Acceptable Transfer:**

- a. Student meets the basic standards for credit as defined on page 1 of the Articles of Agreement for Tech Prep Articulation including earning 80% or better in course above.
- b. Student has completed the designated course of study attached and is prepared to begin college level work.
- c. Student presents the signed and completed Tech Prep Articulated Certificate of Credit.
- d. Student also meets these specific standards defined by program area:

*Kenneth C. Cobb*  
High School Representative

\_\_\_\_\_  
St. Louis Community College Faculty

4-23-99  
Date

\_\_\_\_\_  
Date

Renewal Date 4/23/99



# LINN STATE

## Technical College

### AUTOMOTIVE TECHNOLOGY

#### Articulation Agreement

#### Between

Linn State Technical College And Lewis + Clark Career Center

**General Understanding:**

Linn State Technical College seeks to expand educational opportunities to students through advanced and professional technical education.

**PROGRAM SPECIFICS:**

COURSES WEIGH QUALITY FOR ARTICULATED CREDIT					
COURSE DESCRIPTION	COURSE NO.	CREDIT HOURS	SECONDARY COURSES TITLE/DESCRIPTION	HRS. OF LIVE WORK	COURSE NO.
Articulation credit will be automatically granted in two of the four major courses at LSTC for a student who has had formal instruction in an NATEF/ASE certified program and passed the associated ASE test.					
Automotive Engines Mechanical	AMT 145	5.0			
Automotive Electrical/Electronics I	AMT 101	4.0			
Automotive Braking Systems	AMT 205	4.0			
Automotive Suspension and Steering	AMT 206	4.0			
<b>CREDIT EARNED</b>		<b>17.0</b>			
* A MINIMUM OF 120 HOURS OF SUPERVISED LIVE WORK TO ACHIEVE MASTERY OF NECESSARY COMPETENCIES IS NEEDED TO OBTAIN ARTICULATED CREDIT FOR EACH AREA.					

**SIGNATURES:**

LSTC agrees to grant college credit to students based on the "Goals, Guidelines, Procedures and the program specific guidelines/amendments" provided in the agreement.

We have reviewed this agreement and the supporting instruments and agree to the terms of this articulation agreement.

LINN STATE TECHNICAL COLLEGE

AND

City of St. Charles School Dist. - R-VI  
(School District)

Don R. Helven Date: 11/04/98  
Vice President of Academic Affairs, LSTC

Leann C. Cook Date: 9-17-98  
Director

Michael S. Glezic Date: 10/28/98  
Department Coordinator, LSTC

Steve Reese Date: 9-17-98  
Program Instructor

**Minutes**  
**Lewis and Clark Career Center**  
**Automotive Technology Advisory Board**  
**May 13, 2009**

The Meeting was called to order at 7:00.

Minutes from the prior meeting were read and approved.

Introduction of attendees:

Attendee's: Glenn Seithel, Steve Reese, Chris Wessel, Ron Reilling, Jay Moore,  
Karen Kennedy, Mark Reese

Items of business:

1. Approve budget 1/20 Napas raffle will be donated

2. Senior rec. night. Tool box presentation

Money put in buy Jay Moore, and Ron Reilling 50/50 Dollars from both of the  
"runners up"

3. 2009-2010 goals

Budget money- revamp tool box process- milestones set adding new members from  
Industry, management and personnel

4. Possible hosting Skills USA in 2010

Might be possible we will find out in August

5. Setting meeting schedule for 2009-2010

Sept/ Nov/ Jan/ March/ May 2<sup>nd</sup> Wednesday of the month

More members to the board

No Items from the Floor

Adjournment at 8:30

**Minutes**  
**Lewis and Clark Career Center**  
**Automotive Technology Advisory Board**  
**January 14, 2009**

The Meeting was called to order at 7:00.

Minutes from the prior meeting were read and approved.

Introduction of attendees:

Attendee's: Glenn Seithel, Steve Reese, Chris Wessel, Ron Reilling, Jay Moore,  
Scott Hinkle and Randy Orlowski.

Items of business:

1. Tool box assessments

2. Fundraiser

    Trivia night/ golf tournament

3. ASE advisory council evaluation of program

4. Competitions

No Items from the Floor

Adjournment at 9:10

Lewis & Clark Career Center  
Advisory Committee Member Profile

Name: Frank Fessler Jr. Age: 52  
Address: 539 N. Fifth St., St. Charles, Mo. 63301-1864  
Telephone: 636-949-0911 636-734-1582 636-447-4924  
Home Work Pager Fax  
Name of Company: CARQUEST Auto Parts  
Position/Title: Sales Representative

Involvement in Labor (Journeyman, Union Member, other):

N/A

Do you have children enrolled in public school?

YES

NO

If so how many? 2

Community Involvement (Little League, church, civic, etc.)

Church Activities  
School Boosters / Athletics / PTA

Reason for Member Profile Form:

To qualify for a Vocational Enhancement Grant at 75% funding, we must have an advisory committee of twelve or more members comprised of local business persons, labor leaders, parents, senior citizens, and community leaders.

Lewis & Clark Career Center  
Advisory Committee Member Profile

Name: BRADLEY SCOTT HINKLE Age: 39  
Address: 263 Hillside Rd. Four Seasons MO. 65049  
Telephone: (573) 614-2882 / (573) 746-7100 (573) 746-7110  
Home Work Pager Fax  
Name of Company: Health Systems, Inc.  
Position/Title: Attorney

Involvement in Labor (Journeyman, Union Member, other):

\_\_\_\_\_  
\_\_\_\_\_

Do you have children enrolled in public school?

YES

NO

If so how many? \_\_\_\_\_

Community Involvement (Little League, church, civic, etc.)

EKS, ROTARY  
\_\_\_\_\_  
\_\_\_\_\_

Reason for Member Profile Form:

To qualify for a Vocational Enhancement Grant at 75% funding, we must have an advisory committee of twelve or more members comprised of local business persons, labor leaders, parents, senior citizens, and community leaders.

Lewis & Clark Career Center  
Advisory Committee Member Profile

Name: JAY MOORE Age: 50

Address: 3444 SUTTON CT. ST. CHARLES MO 63301  
Street City State Zip

Telephone: 636 946-4578 636-723-2600  
Home Work Pager Fax

Name of Company: SAFEWAY TIRE CENTER, INC.

Position/Title: PRESIDENT

Involvement in Labor (Journeyman, Union Member, other):  
\_\_\_\_\_  
\_\_\_\_\_

Do you have children enrolled in public school? YES NO

If so how many? 2

Community Involvement (Little League, church, civic, etc.)  
TROOP CHAIRMAN - BSA TROOP 351 BOONE TRAILS DIST.  
SCW BAND BOOSTERS  
\_\_\_\_\_

- Reason for Member Profile Form:  
To qualify for a Vocational Enhancement Grant at 75% funding, we must have an advisory committee of twelve or more members comprised of local business persons, labor leaders, parents, senior citizens, and community leaders.

Lewis & Clark Career Center  
Advisory Committee Member Profile

Name: RANDALL ORLOSKI Age: 52

Address: 94 PHILLIP DR ST CHARLES MO 63301  
Street City State Zip

Telephone: 636-250-3032 314-817-2476 — —  
Home Work Pager Fax

Name of Company: HUEY'S HONDA

Position/Title: SERVICE ADVISOR

Involvement in Labor (Journeyman, Union Member, other):

UNION MEMBER

Do you have children enrolled in public school? YES  NO

If so how many?       

Community Involvement (Little League, church, civic, etc.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reason for Member Profile Form:

To qualify for a Vocational Enhancement Grant at 75% funding, we must have an advisory committee of twelve or more members comprised of local business persons, labor leaders, parents, senior citizens, and community leaders.

Lewis & Clark Career Center  
Advisory Committee Member Profile

Name: Chris Wessol Age: 36

Address: 2 Hanging Tree Court St. Peters MO 63376  
Street City State Zip

Telephone: 636 244-0286 314-651-4457  
Home Work Pager Fax

Name of Company: Roland Machinery Company

Position/Title: SERVICE TECH

Involvement in Labor (Journeyman, Union Member, other):

Journeyman / 513 operating Engineer Union

Do you have children enrolled in public school?

YES

NO

If so how many? 1

Community Involvement (Little League, church, civic, etc.)

Assistant Cub Master Pack 916 Cub Scouts

Reason for Member Profile Form:

To qualify for a Vocational Enhancement Grant at 75% funding, we must have an advisory committee of twelve or more members comprised of local business persons, labor leaders, parents, senior citizens, and community leaders.

UNIT  
INTRODUCTION TO AUTO MECHANICS

CODE A	COMPETENCY SAFETY	TEACHING METHOD	RESOURCES	TESTS 80%	TEST QUESTION	JOB SHEET 100%	ASE TASKS	SHOW-ME Knowledge (Content)	STANDARDS Performace (Goals)
1or A001	identify the safe use of chemicals	L,D	I-cha 3, I-p 54-56,239, N	I-2(#02) V-12 (#65)	1~10,19,22,26, 42,43,60 10	n/a	n/a	S-8	1.7
2	identify the safe use of hand tools	L,D,S	T-p 31 cha 3 I-cha 4	I-2	32,33,56	n/a	n/a	S-2 M1	3.6 3.3
3	identify the safe use of power tools	L,D	T-p 43 cha 4 I-cha 5	I-2	28,34,35,37,61	n/a	n/a	S-2 M1	3.3
4	identify the safe use of protective clothing and equipment	L,D	T-p 52 cha 5 I-cha 5	I-2	11,12,15~18,2 7,29~31,39,40, 45,46,51,52	n/a	n/a	HP-3	4.7
5	identify the safe use of fire protection equipment	L,D	T-p 54-55 I-cha 5	I-2	25,41,44,62~6 5	n/a	n/a	HP-7	3.6
6	identify the safe use of shop equipment	D,L,V	T-p 52 cha5 V-hoist safety	I-2	13,14,21,24,36 , 38,47,49,50,53 - 55,57-59	JS1-2	n/a	S-2	3.2 3.3
7	follow EPA & OSHA regulations	L	T-p 1029-30 I-cha 7	I-2	20,23	JS1-2	n/a	S-8	4.7

Teaching codes

L-lecture, D-demonstration, S-student study, V-video, O-overheads

Resource codes

T-Modern Auto. Technology, I-impl module, V-video, N-notes gathered, M-manuel

CODE	COMPETENCY SHOP OPERATION	TEACHING METHOD	RESOURCES	TESTS	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
B				80%		100%			
1	communicate with customers and write repair orders	L,D,O	O T-p 27	repair order		n/a	n/a	C-1	2.3
2	estimate time and cost & order parts	L,D	T-p 73 M-estl.@time	T/J		n/a	n/a	M-1	3.1
3	obtain app. info from shop manuals	L	T-p 67 cha 7	T/J		JS 1-8	n/a	C-3	1.10
4	practice clean and orderly work habits	L,V,D	V	T/J		JS 1-2 JS 1-3	n/a	H-2	4.7

CODE	COMPETENCY COMPONENTS & CAREERS	TEACHING METHOD	RESOURCES	TESTS	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (Content)	STANDARDS Performance (Goals)
C				80%		100%			
1	identify basic function and operation of vehicle mechanical components	L,D,S	T-p 9 cha 1	T/J		n/a	n/a	S-1	1.6
2	identify auto. Mech, career opportunities and duties of a technician	L, V, S	T-p 25 cha 2	T/J		n/a	n/a	S-4	4.8

UNIT-II  
ENGINE REPAIR

CODE M	COMPETENCY ENGINE DIAGNOSIS-REMOVAL & REPLACE	TEACHING METHOD	RESOURCES	TESTS 80%	TEST QUESTION	JOB SHEET 100%	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
1	conduct performance tests & determine needed repairs	L, D, V	T-p107 cha11 T-p569 cha45 I-er23-	II-13 II-14	1-20 3,11-13, 19,20,25,28,30, 35	JSV-2 JSV-4 JSV-6	A1-8	S7 C3 M3	3.1 3.2 3.3
2	remove and replace engine (front and rear wheel drive)	L, V	T-p581cha46 T- 631 cha49 I-mod.4 pa71- 80 I m4 p9,46-49				A9-12	HP6	4.5

CODE N	CYL. HEAD & VALVE TRAIN DIAGNOSIS & REPAIR	TEACHING METHOD	RESOURCES	TESTS 80%	TEST QUESTION	JOB SHEET 100%	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
1	remove cylinder head(s)	L, V, D	T-p137 cha 12 T-p609 cha 48 I-m4 er89				A13	S7 C3	3.2 1.1
2	install cylinder head(s)	L,V, D	see above				A14	S7 C3	3.2 1.1
3	reconglition cylinder head	L, V, D	see above				A15-22,28	S7 C3	3.2 1.1
4	inspect and replace cam and related components	L, V, D	see above				A23-27,H 64,65	S7 C3	3.2 1.1

CODE O	SHORT BLOCK DIAGNOSIS AND REPAIR	TEACHING METHOD	RESOURCES	TESTS 80%	TEST QUESTION	JOB SHEET 100%	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
1	inspect and replace pans , covers, gaskets and seals	L, V, D	T-p85 cha9 I-p 46,47,143- 157 V	II-14 II-2	9,32-34	JSII-2	A29	C3	3.2
2	disassemble , inspect. & clean short block assembly	L,V,D	T-p593 cha47 I-p47,143-157	II-10 II-2	1,3,5,11- 19,21,23-26, 28-35	JSII-2	A30,- 32,41, 42,45, 48	M1	3.1
3	check & record short block measurements	L, D, V	T-p58 cha6 T-p593 cha47 I-47,143-157 V	II-10	9,10	JSI-4	A33, 36,	M1	3.1
4	check & record component measurements	L,V,D,	T-p58 chap. 6 I-p143-157 V	I-10 II-10 II-12	1-20 8 1-20	JSI-4	A33, 35-40	M1	3.1
5	clean and prep block and components for reassembly	L.V.D.	T-p151 cha14 T-p593cha47	II-10	6,7	JSII-3	A28, 34,38- 39,41, 43,44	C3	3.2
6	Reassemble short block using correct lube, gasket & torque	L.V.D.	T-p593 cha 47 T-p85 cha 9 T-p97 cha 10 I-p252-255	II-10	2,4,22	JSII-4	A35, 39,40, 44,45	C3	3.2

CODE	ENGINE COMPLETION AND START UP PROCEDURE	TEACHING METHOD	RESOURCES	TESTS 80%	TEST QUESTION	JOB SHEET 100%	ASSESS TASKS (content)	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
P									
1	complete engine assembly & prelubc	L.D	I-P255-256	11-14	4-8,10,14-18,21-24,26,29	JSII-10	A25, 46,47,H 64,65	C3	3.2
2	start engine & set fuel & ignition. system to manufacturer's specs.	L.	T-P539 Ica 41 I-P255-256				H25, 37-40	C3	3.2

UNIT III  
LUBRICATION, HEATING,  
& COOLING

CODE Q	LUBRICATION COOLING SYSTEM DIAGNOSIS & REPAIR	TEACHING METHOD	RESOURCES	TEST 80%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
1	inspect and repair oil system and components	L, D	T-p486 cha37 T-p498 cha38	II-10 II-14 III-20	20,27 31 1-3,11,22-25	JSIII-2	A47, 48,58, 59	S2	3.2
2	perform cooling system test & determine needed repairs	L, D, O	T-p459 cha35 T-p473 cha36 I-p283-287	III-10	8,10,12,21, 23,25,26,31, 34,35	JSIII-5	A49, 54-47, G20,H 66,67	S2 M1 C1	3.1 1.4 1.8
3	inspect, replace, & adjust drive belts & hoses	L, D,	T-p383,34, 169 I p283-290	III-10	2,5,8,28,30	JSIII-5	A50, 51,G 21,22	S2	3.2
4	replace cooling system components (thermostat, radiator, controllers)	L, D, O	T-p473 cha36 I-p283-295	III-2 III-10	1-20 18,19,20	JSIII-12	A49, 51,52, 54-56,G 22,25, 26,H 68,69	S2	3.2
5	inspect coolant, drain, flush,& refill cooling system	L, D	T-p473 cha36	III-10	3,4,9,11, 13- 17,22	JSIII-4	A53,G 21,24	S2	3.2
6	perform LOF service on normal & turbo engines	L, D	T-p498 cha38	III-20	4-10,12-16,18- 21	JSIII-22	A58, 60,	S2	3.2

CODE Hh	COMPETENCY HEATING SYSTEM	TEACHING METHOD	RESOURCES	TEST 80%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
1	diagnose & repair heating system problems	L, D, V	T-p941 cha71 I-p235-362	III-10	1,7,20,22,23		G19- 21,30, 31	S2	
2	inspect & replace heating system components	L, D	T-p959 cha72 I-p225-235	III-10			G22- 26,31-34	S2	3.1

CODE Ee	COMPETENCY AUTOMATIC TRANSMISSIONS	TEACHING METHOD	RESOURCES	TEST 80%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
2	service automatic transmissions	L,D	T-p99,100, 716-717 I-p 55	III-20	17	JSIII-24	B2,8, 12,13, 29	S2, M1 C1 C3 C4	3.1 1.4 1.8 3.2 4.4

CODE U	COMPETENCY MANUAL DRIVE TRAIN	TEACHING METHOD	RESOURCES	TEST 80%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
4	rotate & balance tire & wheel assemblies	L, D,	T-p815-819			JSVI-1 JSVI-2	D49, 50,54, 56,59, 60,61	S2	3.2

CODE	COMPETENCY	TEACHING METHOD	RESOURCES	TEST80 %	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW -ME Knowledge (content)	STANDARDS Performance (goals)
E	BATTERY DIAGNOSIS AND SERVICE								
1	clean & inspect battery clamps, cables, & components	L, D, V	T-p335 cha 26, T-p342 cha 27 I-p156-159			JSIV-6	F15	HP1 S1	4.7 3.2
2	perform battery condition tests	L, D.	T-p342 cha 27 I-p161-172	IV-10 IV-20	1-4 3,31,37	JSIV-12	F10, 11	S1	3.1
3	jump start a vehicle	L, D.	T-p349 I-p196-197			JSIV-12	F16	S1 HP1	3.2 4.7
4	charge & install a battery	L, D	T-p342 I-p193-196	IV-20	14,15,38,39	JSIV-10	F12- 14	S1	3.2 4.7

4

CODE	COMPETENCY	TEACHING METHOD	RESOURCES	TEST80 %	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW -ME Knowledge (content)	STANDARDS Performance (goals)
F	STARTING SYSTEM DIAGNOSIS & REPAIR								
1	diagnose starting system & determine needed repair	L,D,V	T-p354 cha 28 T-p364 cha 29 I-p341-354	IV-20	6-8	JSIV-16	F17, 18,20	C3 M1	4.1 4.7 1.7
2	remove ,clean, & inspect starter motor & components	L, D, V	T-p364 cha29 I-p219-240	IV-20	30,32,40,41, 46	JSIV-34	F19	C3	4.5 4.1
3	repair or replace starter motor components	L, D, V	T-p364 cha 29 I-p255-276			JSIV-36	F19	C3	3.2

UNIT IV  
ELECTRICAL SYSTEMS

CODE D	COMPETENCY GENERAL ELECTRICAL SYSTEM DIAGNOSIS	TEACHIN G METHOD	RESOURCES	TEST 80%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
1	check cont. in elec. circuits using test light and volt meter	L, D,O	T-p18,27,74-84, cha26 p335, cha 27 p342 l-p386-389,428	IV-20	34,36	JSIV-20 JSIV-26	E38, 39,F1, 2,8,9	S1 M1 C3	3.1 1.1
2	check for shorts, opens and grounds	L, D,	see above	IV-20	6-9,46,47	JSIV-26	F2,5-7	S1	3.1
3	measure resistance in elec. circuits using and ohmmeter	L, D,V	T-p see above l-p425	IV-20	4,17,35	JSIV-28	F6	S1	3.1
4	measure volts with a voltmeter	L, D, V	T-p see above l-p168,427,429	IV-20	5,16,20,48, 49	JSIV-28	E38, 39,F3	S1	3.1
5	measure current with an ammeter	L, D,V	T-p see above l-p168,170-172	IV-10 IV-20	5 1,2,18,19,21	JSIV-28	F4	S1	3.1

CODE	COMPETENCY	TEACHING	RESOURCES	TEST	TEST	TEST	JOB	ASSE	SHOW -ME	STANDARDS
G	CHARGING SYSTEM DIAGNOSIS &	METHOD		80%	IV-10	IV-20	SHEET	TASKS	Knowledge	Performance
	REPAIR								(content)	(goals)
1	diagnose charging system and determine needed repairs	L, D, V	T-p377 cha30 I-p307-341				JSIV-14 JSIV-38	F21- 23	C3	4.1
2	remove, clean, & inspect alternator	L, D, V	T-p389, cha 31				JSIV-40	F24, 25	C3	4.1
3	repair or replace alternator components	L, D, V	T-p389 cha31 I-p385-389				JSIV-40	F24, 25	C3	4.1
4	repair or replace charging system components	L, D, V	same as above				JSIV-40	F23	C3	4.1

CODE	COMPETENCY	TEACHING METHOD	RESOURCES	TEST %	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW -ME Knowledge (content)	STANDARDS Performance (goals)
11	COMPETENCY LIGHTING SYSTEM DIAGNOSIS & REPAIR	L, D,	T-p446 cha34 1-p407 M	IV-20	22,23	JSIV-20	F26-28	C3	4.1
1	diagnose lighting system problems & determine needed repairs	L, D,	T-p446 cha34 1-p407 M	IV-20	22,23	JSIV-20	F26-28	C3	4.1
2	repair or replace lights, sockets, wires & switches	L, D,	T-p446 cha34 1-p425-465 M	IV-10	10,11,13	JSIV-22 JSIV-24	F27, 28	C3	4.1
1	COMPETENCY GAUGES & ELECTRICAL ACCESSORIES	L, D, M	T-p469,496 1-p4830505	IV-20	44	JSIV-30	A59,E 38,39, F29-35	C3	4.1
1	diagnose & repair gauge & warning circuits	L, D, M	T-p469,496 1-p4830505	IV-20	44	JSIV-30	A59,E 38,39, F29-35	C3	4.1
2	diagnose & repair electrical accessories (horn, wipers motor)	L, D,	T-p446 cha34	IV-20	43	JSIV-22 JSIV-32	F36-43	C3	4.1

UNIT-V  
ENGINE PERFORMANCE

CODE	COMPETENCY	TEACHING METHOD	RESOURCES	TEST80 %	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW -ME Knowledge (content)	STANDARDS Performance (goals)
1	conduct engine performance test using analyzer & determine needed repairs	L, D, S	T-p539 cha41 T-p553 cha43 I-p85-143	V-5 V-10	1-10 20,21,23-25	JSV-8	H1-10 15,16, 19,20	S2 M3 C3 S7	3.1 3.2 4.1 3.7
2	inspect, repair or replace primary ignition components	L, D, S, V	T-p543 cha42 T-p565 cha44 I-p169-186	V-10	2-4,8,9,14- 16,22,28,30	JSV-12	H14, 15,21, 22,24 25-28	M1 M2 S2	3.1 3.3 4.4
3	inspect, repair or replace secondary ignition components	L, D, V	T-p563 cha43 T-p565 cha44 I-p188-219	V-2 V10	1-7 1,5-7,11-13, 17-19,26,27	JSV-14	H15, 23,24	M1 M2 S2	3.1 3.3 4.4
4	adjust ignition system to manufactures specification	L, D,	T-p565 cha44 I-p177-179	V-10	10,29,31-33	JSV-16	H15, 25	M1 M2 S2	3.1 3.3 4.4
5	perform on board computer system diagnosis	L, D,	T-p1003 cha75 I-p145-174			JSV-18	H11, 15	S2 M3 C3 S7	3.1 3.2 4.1 3.7
6	repair or replace computer system components	L, D	T-p1017 cha 76 I-p145-174			JSV-20	H-12, 13,15, 18	M1 M2 S2	3.1 3.3 4.4

CODE K	COMPETENCY FUEL & EXHAUST SYSTEMS	TEACHING METHOD	RESOURCES	TEST8 0%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW -ME Knowledge (content)	STANDARDS Performance (goals)
1	diagnose fuel system problems & determine need repairs	L, D	T-p178 cha17 l-p5-29	V-12	1-7,14,20, 22,23,25- 28,31-33	JSV-10 JSV-30	H15, 29,30	S8 S1 M1 C3 HP6	4.7 3.1 1.2 3.2 4.7
2	inspect ,repair or replace fuel supply components	L, D	T-p191 cha18 l-p17-29	V-12	15,16,29,30	JSV-32 JSV-34	H15, 31-34, 36,41	S1 M1 C3	3.1 1.2 3.2
3	disassemble, clean & inspect carburetors	L, D, O	T-p210 cha19 i-p55-1-4	V-12	8,9,11- 13,17,21,24	JSV-36	H15	S1 M1 C3	3.1 1.2 3.2
4	reassemble & adjust carburetor	L, D,	T-p233 cha20 l-p104-121	V-12	18,19		H15	S1 M1	3.1 1.2
8	diagnose & repair exhaust system	L,	T-p319 cha25				H15, 42	S2 M1	3.1

CODE	COMPETENCY	TEACHING	RESOURCES	TEST	TEST	JOB	ASE TASKS	SHOW-ME	STANDARDS
	EMISSION CONTROL SYSTEMS	METHOD		80%	QUESTION	SHEET		Knowledge (content)	Performance (goals)
1	diagnose emission control system & determining needed repairs	L.D.S	T-p509 cha39 1- pl-157	V-14	I-20	JSVI-40	H15, 43-47, 50,54, 58, 60,62,63	C3	3.2 1.1
2	clean, inspect or replace PCV system components	L.D.O	T-p527 cha40 1- p5-8				H15	C3	3.2 1.1
3	clean, inspect or replace spark timing controllers	L.D.O	T-p527 cha40 1- p137-157				H15, 56	S7 C3	3.2 1.1
4	clean, inspect or replace idle speed controllers	L.D	T-p527 cha40 1- p143-157				H15, 48,49	S7 C3	3.2 1.1
5	clean, inspect or replace EGR	L.D.S	T-p527 cha40 1- p37-46				H15, 50-53	S7 C3	3.2 1.1
6	clean, inspect or replace air management systems	L.D	I-p75-94				H15, 54-57	S7 C3	3.2 1.1
7	clean, inspect or replace air inlet temperatur control	L.D	I-p115-118				H15, 59	S7 C3	3.2 1.1
8	clean, inspect or replace intake heat controls	L.D	I-p121-124				H15 81	S7 C3	3.2 1.1
9	clean, inspect or replace fuel vapor controls	L.D	I-p15-26				H15, 62-63	S7 C3	3.2 1.1

UNIT-VI  
MANUAL DRIVE TRAIN & AXLES

CODE	COMPETENCY CLUTCH	TEACHING METHOD	RESOURCES	TEST 80%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
2	replace and adjust clutch assembly	L	T-p653 chas1-1- p153-159				C2.10	C1 M1 S2	1.8 1.4 3.2
1	diagnose, performance test, & determine needed repairs	L,V	T-p642 chas0 1-p115-130, 143-157				C1.2.4-6.8	C1 M1 S2	1.8 1.4 3.2

CODE	COMPETENCY MANUAL TRANSMISSION/TRANSAXLE	TEACHING METHOD	RESOURCES	TEST 80%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
1	diagnose, performance test & determine needed repair	L	T-p663 chas2 1-p73-76, 289-362 T-p769 cha60				C11.13, 14,24,26,39,4 3,46	S2 M1 C1 C3 SS4	3.1 1.4 1.8 3.2 4.4
2	remove, disassemble, inspect & clean manual trans, & shift linkage	L,V	T-p681 chas3 T-p787 cha61 1-p81-86, 335-360				C12- 17,25,27,28,3 0,31,40,44	S2	3.2
3	reassemble manual trans, assembly, check, play and adj.	L,V	T-p681 chas3 T-p787 cha 61 1-p95-99, 361-362				C12-23, 25,27-29,31- 38,40,45	S2	3.2

CODL	COMPETENCY DRIVE SHAFT, CV-JOINT & FWD BEARINGS, DIAGNOSE & REPAIR	TEACHING METHOD	RESOURCES	TEST 80%	TEST QUESTION	JOB SHEET	ASE TASKS	SHOW-ME Knowledge (content)	STANDARDS Performance (goals)
Bb									
1	diagnose and determine needed repairs	L,D	T-p723 cha56 T-p769 cha60 I-p171-192				C41-43,46, D27,39	S2	3.1
2	inspect, service & replace front axle shafts	L,D	T-p787 cha61 I-337-341				C44	S2	3.1
3	inspect, service and replace drive shafts and components	L,D	T-p732 cha57 I-187-192				C44	S2	3.1

## DAILY LESSON PLANS

### Lesson 1

First Day

### INTRODUCTORY SESSION

#### PURPOSE

That all students will know what is expected of them and how to conduct themselves within the class room and in the school at Lewis and Clark Career Center.

#### SUPPLIES NEEDED:

- L@C Handbooks
- personal info sheets
- note books for sale \$6.00
- St. Charles dist. Handbook

#### I. Welcome ( 1.hr?)

##### A. Introduction

1. On board name Mr. Thavuis Lewis (Mr. Reese AST-II Teacher)
  - a. To be called Mr. Lewis by all students

##### B. Seating of students in Alphabetical order to learn names

1. To stay this way for the year (move only to accelerate learning of individual.

##### C. Roll Call

1. Office attendance sheet and turn in to office

##### D. Have students to introduce themselves and to learn name pronunciation.

##### E. Check on Registration forms and turn to office those not turned in.

#### II. Course Description ( 30 min)

##### A. Lewis and Clark student handbook (folder) ( to be read)

##### 1. Contents

- a. St. Charles School dist.handbook ( to be read)
- b. Course outline *OH, 2*
- c. Grade information
- d. Beginning Tool Set List (see tool men about a discount for students)
- e. Fire and Tornado Procedures *OH, 1*
  1. Show where to meet.
- f. Tour of school area
- g. Show job sheets to students and have them returned to you.
- h. Sheet for secondary education ( handout)
- i. Driving permit in folder fill out and return to me. *CH, 0*

#### III. Student Requirements (1hr.)

##### A. Review L@C handbook

##### B. “ St. Charles Dist. Handbook

##### C. “ AST. I Course Description sheet (and Course Lesson plan notebook (mine))

##### D. Equipment Requirements

1. Work clothes.(may wear coveralls or street clothes but must be willing to get them dirty without complains or slowing of work required)

2. Safety Glasses must be worn in shop and on hazardous jobs in class. (can be purchased in office for \$3.00)
3. Work shoes Preferred (something with no slip sole and heel)
4. 6" steel scale with clip (Sears has them)
5. 3-ring Notebook with loose leaf paper ( to be purchased here for approx. \$6.00)
6. # 2 pencils for scantrons sheets (O.H. 0)
7. Student information sheet fill out and hand in.

#### IV. Review Rules and Regulations. (30 min)

##### A. Attendance

1. 90% attendance to get Certificate (Passport) with 74% grade
2. Bell Schedule (posted on bulletin board)
3. Tardy or Absent ( 3+ days per qtr allowed next day = 2 pts off final qtr grade)  
( 3 tardies = 1 day absent)
  - a. Note from parent or guardian
  - b. Office admit slip
4. Must have permission from office to leave early
5. Makeup work available from teacher for days missed
  - a. Test missed can only be made up if excused absents.
6. Snow closing information (listen for St. Charles City Schools )

##### B. Transportation to Lewis and Clark

1. Parking passes required if driving or riding ( can be revoked)
2. Temp. Pass for vehicle service, etc. (Office)
3. Bus Arrival require no special pass (tardies not counted)

##### C. Dress codes (Lewis @ Clark handbook)

## Day 2

#### V. Introductions of Staff. (As per their schedule) (30 Min)

- A. Dr. Cobb (director)
- B. Mrs Haas. ( Counselor)
- C. Mrs Weineke (Placement coordinator)
- D. Mrs Dorlac (Tech. Support)
- E. Mrs Gronnberg V.E.R.

#### VI. Introduction to Shop ( 1 hr) (Video Career Opportunities in Automotive )

##### A. Shop days tuesdays and thursdays (Friday)

1. Tour shop area
2. Tour tool room
3. Supply room
4. About donated cars

##### B. Shop Preparation

1. Switch locker locks downstairs
2. Assign Lockers (by Sex)

3. Clean up Assignments ( 2 or 3 per sheet assignment)
  - a. Ever shop day
  - b. Sheet on bulletin board
4. Assign tool chips to students

### **Day 3**

5. Assign Text books to students

#### **VII Extra curriculum Activities. ( 30 min.)**

##### **A. VICA (Vocational Industrial Clubs of America).**

1. Explain (overheads)
2. Elect officers
  - a. President
  - b. Vice President
  - c. Secretary
  - d. Treasurer
3. Sign up sheet for Leadership Conference (2 students per class)

## **UNIT -I**

### **Safety**

#### **Objective**

Is that all students will understand why we must have safe working habits and conditions in the work place for their own benefit and that of others. This will be taught and demonstrated by reading , video, overheads , demonstrations and examples. A test will have to be passed 100% by all students before they can perform any tasks in the shop.

#### **Lesson 2**

##### **I. Identify the use of Chemicals. (Unit I competency A-1)(IML cha 3 unit I p54-56,239)**

###### **A. Parts Cleaning**

1. Needed supplies:
  - a. Solvent, Carb clnr spray, Digestive clnr, Gasket clnr, Brake clnr,
2. Parts Washing Solvent
  - a. For large parts
  - b. Can irritate skin or eyes and nose (q1)
  - c. Not the same as Digestive Type Carb. Clnr. (q4)
3. Carburetor and Choke Cleaners
  - a. For assembled parts cleaning
  - b. Highly Flammable
  - c. Skin, eye, nose irritant
4. Digestive Car. Or parts cleaner
  - a. Extremely Irritating to skin, eyes (fumes) , never breath fumes , do not stand directly over open container when using .

- b. Use for disassembled carburetor parts only (metal) no plastic or rubber
- c. Never use with a rag to apply (q6)
- d. Not for large engine parts. (q5)
- 5. Gasket Cleaners.
  - a. Extremely flammable (q3) (as all of the above are)
  - b. Irritations from this product.
- 6. Brake Cleaner.
  - a. Precautions as above
  - b. Cleans upholstery *if sprayed on and removed quickly with a rag* carefully and check on hidden area before using on exposed area.
- 7. Chemical not to be used as solvents.
  - a. Gasoline never to be used! (q7)
  - b. Lacquer Thinner (q8)
  - c. Consult instructor before using any chemical. (q9)
- 8. Liquid Detergents and cleaning solutions.
  - a. Used to scrub cyl wall and block after honing and glazing .(q10)

## B. Lubricants

- 1. Standard and Heavy oils
  - a. Spontaneous Combustion? What is it?
    - 1. Oily and dirty rags stored in air tight containers (Metal) (q25)
- 2. Oil spills must be cleaned up immediately. (q43)
  - a. Use floor dry and sweep up as soon as feasible.
- 3. Dirty oil can cause cancer (use care in changing oil and fluids)
  - a. Danger of burns from hot oils.

## C. Gases and Dust in the work area.

- 1. Exhaust gases.
  - a. Must be vented to the outside of shop (hoses and power vent)
  - b. CO carbon monoxide not detectable ( silent killer) (q26)
- 2. Gasoline
  - a. Must be stored in UL approved cans .(q19)
- 3. Freon
  - a. Harmful or fatal if burned in flame
  - b. Harmful if inhaled (displaces Oxygen in the lungs)
  - c. Harmful if taken internally.
  - d. Harmful if splashed in eyes or on skin (freezes skin and eyes)(q22)
- 4. Acetylene @ Oxygen Torch Use
  - a. Never use OIL on oxygen equip (q21)
  - b. Used for welding and cutting of medals only (q24)
  - c. Acetylene is a very unstable gas use care in handling of bottle  
Is an hydrocarbon gas
  - d. Oxven and oil do not mix Will explode violently danger.

**D. Hydraulic fluids:**

1. Transmission fluids
  - a. Type f -ford only early models
  - b. Dexron 1-II G.M
  - c. Dexron III Most modern vehicles
  - d. Flammable
2. Jack oils
3. Brake fluids
  - a. Damage paint
  - b. Dot 3 or higher and read labels on vehicles
  - c. All have the flare or fire dangers.

**E. Othe dangerous chemicals**

1. Battery Acid (sulpheric acid)
  - a. Skin burns
  - b. Eye damage
  - c. Lung damage
  - d. Paint damage
  - e. Very corrosive
2. Engine coolant
  - a. Skin irritant
  - b. Eye damage
  - c. Paint damage if not washed off quickly.

**Day 6****Lesson 3****II. Identify the safe use of hand tools. (A2)****Objective**

That all students may identify by sight the different hand tools needed to repair an automobile .

All students shall be able to properly select wrenches or sockets to tighten a bolt to manufactures specifications on any given engine or part.

That student will not damage bolts and nut and equipment by using the proper tool and that they may be able to pass a test to identify tools properly to at least a 60% grade average.

**A. Equipment needed:**

- 1.(Supplies, various hand tools, pliers , vicgrips, screw drivers , cutters , ratchets, sockets 6-12points, scrapers, open and box wrenches, extensions, hammers, mallets, etc.)
2. Over head for testing on tools ( later take test refer to Mod. I IML pa. 31 for tool information.
3. Torque wrenchés , eng. Block for demo.?

**B. Hand Tools and their use.**

1. Use proper tool.
  - a. 6pt is best tool to use on hex. Heads , good stress distribution, does not round heads
  - b. Use proper size drive. 1/4,3/8, 1/2.
  - c. Pull toward you not away for better control if possible
  - d. Sockets for quickest work
  - e. Keep tools clean and in good repair
    1. Chisels ( no mushroomed heads)
2. Purchase good tools
  - a. Snap On
  - b. Mac ,etc
  - c. Warrenty
3. Show students tools and their uses.

**Lesson 4****III Identify the safe use of Power Tools (A3) (A4)****Objective**

That all students will be able to use power tools safely and quickly without damage to equipment and components that are being repaired.

That all students will be able to use equipment to speed repairs without broken bolts on all engine components to 100% accuracy with J. S.s signed off by the instructor

That all students in the class will be able to pass a safety test with 100% accuracy.

**A. Equipment-( demo)**

- |                      |                   |
|----------------------|-------------------|
| 1. Air impact wrench | 5. Electric drill |
| 2. Air ratchet       | 6. Heat gun       |
| 3. Air hammer        | 7. Air hose       |
| 4. Air blower        | 8. Air grinder    |

**B. Lecture**

1. Air compressor and supply system
2. Air bubbles in blood stream ( can be fatal) (q49)
3. Flying dust and germs in compressed air. (150 psi) (q49, 28, 34)
4. Always use safety equipment ( safety glasses , etc)

**C. Advantages to power tools.**

1. Quicker
2. Easier
3. Safer in some instances , strains, skinned knuckles.

**D. Dis Advantages.**

1. Noise levels can damage hearing
2. Flying objects can damage eyes and cause cuts and bruises.

3. Breaking of nuts bolts and components.
4. Use safety devices to protect ones person ( glasses, ear plugs, gloves , face shields, clothing ( long sleeves) good shoes (safety toes), (q 18,27,12,29, 30,31.)

### Day 7

**NOTE:** Leave time for school group session , class testing-math, reading and writing, this includes V.I.C.A. Andfund raisers and staff introductions, employment training.

### **Lesson 5**

#### **IV. Identify the safe use of protective clothing and safety equipment: (A4)**

##### Objective

That students may know how to dress appropriately and use the proper safety equipment to avoid injury to themselves and other in the work environment and school.

Students will practice safe equipment and dress usage and pass the Safety test with 100% accuracy

##### A. Clothing :

1. Coveralls preferred , clean, long sleeves (preferred avoid burns), (Q30)
2. Shoes , Not tennis shoes, oil resistant soles, and skid resistant soles,.steel toes mandated in many shops.(q29)
3. Clothing should not be baggy and to loose as to catch in moving equipment.

(Q52)

##### B. Safety equipment (personal)

1. Eye protection , safety glasses, and face shields (q18)
2. Ear protection, plugs, and muffs ( q12)
3. Rings and watches < (electrical burns) (q51)
4. Eye protection must be worn in shop at all times when work activity is going on.
5. Gloves , for welding and cutting with torches, but not on machines. (Q31)
6. Jack stands must be used on all vehicles raised with a floor jack. (Q39)
7. Long hair (q15)
8. Greasy hands and clothing , affect grip and damage cars , upholstery.(q16,11)
9. Keep eyes protection free from scratches for good vision. (Q17)
10. Lift with legs not the back. (Q39)

### **Lesson 6**

#### **V. Identify the safe use of fire protection equipment. (A5)**

##### **OBJECTIVE**

All student shall learn how to use fire extinguisher equipment to avoid inquiry in the automotive shop and to recognize fire classes.

This will be done by lecture and demonstration.

All students will pass at 100% accuracy the safety test questions on the fire equipment knowledge.

A. Class A fires:

1. Materials such as wood , paper, cloth, grasses etc.
2. Water is used to extinguish this type of fire or and extinguisher marked Class A.

B. Class B fires.

1. These fires are fed by gases, liquid
2. A dry powder chemical is used to control this type of fire , use only extinguishers marked for type B fires
3. The chemical is to be directed at the base or origin of the fire source.
4. The dry power generated by this extinguisher must be cleaned up immediately up on use.
5. Avoid breathing the powder residue from these extinguishers.

C. Class C fires.

1. These fires have their origination with electrical sources.
2. Use only dry powder extinguishers on this type of fire the avoid electrocution.

D. Class D fires.

1. These fires are metals that burn at very high temperatures and a special extinguisher marked for type D fires only should be used.
2. Materials such as magniesium.

E. Fire blankets.

1. These are 100% wool blankets used in shop for wrapping people who are on fire to smother the flames.
2. Care should be taken not the use these if people have synthetic clothing which melt when the flame. Nylon

F. SHOW LOCATION OF ALL EXTINGUISHERS IN SHOP.

G. Equipment.

1. Demo extinguishers

**Days 8-10**

ALLOW TIME FOR:

1. Catch up on behind lessons
2. Review for the safety test and give test (2hr)
3. Allow time for Job placement coordinator to do job applicaton with students. (1 hr).
4. By now chapters 1-5 should have been read by students and chapter test given as

# LEWIS & CLARK CAREER CENTER

## COOPERATIVE WORK RELEASE PROGRAM AGREEMENT

- I
1. The cooperative work release program provides an opportunity for a student to work during the time he/she would normally be attending classes at Lewis & Clark Career Center. The program is available to students who have completed the first semester of their second year of instruction at Lewis & Clark.
  2. To qualify for this program, a student must have good attendance, good work habits, make at least a "B" average for the current school year, and be recommended by his/her vocational instructor.  
\*Current Grade: \_\_\_\_\_ \*Days Missed this Year: \_\_\_\_\_  
\*Must be initialed by vocational instructor.
  3. The earliest beginning date for the work program will be the first day of the last semester of the program.
  4. The work experience must be in the occupational field in which the student has received training at Lewis & Clark Career Center.
  5. Students will not be allowed to work for members of their immediate families.
  6. The work release program requires the approval of the vocational instructor, the high school principal, the student's parents, and the vocational director.
  7. The student is responsible for providing a completed employer training agreement prior to the first day of employment.
  8. The student must attend his/her classes at the home school. Should a student fail to attend classes on a day that he/she worked, the agreement is immediately terminated and the student must return to class at Lewis & Clark Career Center.
  9. The student must be on the job during the agreed hours of employment.
  10. Should the employment terminate for any reason, the student must report for classes at Lewis & Clark immediately.
  11. Lewis & Clark Career Center and the home high school will not be responsible for any accidents or job related problems while the student is in route to the job site or during the employment.

This agreement has been read and approved by the following:

\_\_\_\_\_  
Student

\_\_\_\_\_  
Vocational Director

\_\_\_\_\_  
Vocational Instructor

\_\_\_\_\_  
Parent

\_\_\_\_\_  
High School Principal

\_\_\_\_\_  
Date

## EMPLOYER-STUDENT AGREEMENT

II Student's Name \_\_\_\_\_ Employer's Name \_\_\_\_\_

Employer's Address \_\_\_\_\_  
City State Zip

Employer's Telephone \_\_\_\_\_ Starting Date \_\_\_\_\_

Hours of Employment \_\_\_\_\_ Days to Work  M T W TH F   
(Select one day)

Description of work to be performed: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

III The EMPLOYER agrees to provide a training station which will offer as much variety in work experiences for the student as is practically and economically possible, so that the student will receive broad occupational training. This includes adequate supervision and instruction, evaluating the student's progress once every week, not discharging the student without first consulting the coordinator in regard to such matters, not discriminating against students on the basis of race, color, national origin, gender, or disability in making available opportunities in cooperative education; and paying a beginning wage of \$ \_\_\_\_\_ per hour for \_\_\_\_\_ hours per school week. The employer/supervisor agrees to notify the school in case the student is absent or if there are other problems relating to the student's employment.

\_\_\_\_\_  
Employer or Supervisor's Signature Date

\_\_\_\_\_  
Student's Signature Date

NOTE: Return completed form to Lewis & Clark Career Center

# Private Transportation Consent Form

Dear Parent or Guardian, and Student,

At times it becomes necessary to use private vehicles to transport students to and from school sponsored activities. When this occurs, the school district requires the student and their parent or guardian sign the Private Transportation Release Consent Form that appears below:

Name of Activity: \_\_\_\_\_

Location of Activity: \_\_\_\_\_

Date(s) of Activity: \_\_\_\_\_

Name of Sponsor: \_\_\_\_\_

**RETURN THIS FORM TO THE SCHOOL BY: (Date)** \_\_\_\_\_

---

My child, \_\_\_\_\_, has my permission to travel from school property (or other location) to this activity by private transportation, either as the driver or as a passenger in a private automobile driven by another student, parent, or other person. I understand and acknowledge that the St. Charles R-VI School District will have no financial or legal responsibility for injuries arising out of such travel.

By signing this form, I hereby release the District, as well as its directors, officers, administrators, employees, and other agents from all liability for any and all injuries arising from my child's travel to this activity via private transportation. I further agree to indemnify and hold harmless the District, as well as its directors, officers, administrators, employees, and other agents, against any claims asserted by my child as a result of his or her travel to this activity via private transportation.

\_\_\_\_\_  
Parent or Guardian

\_\_\_\_\_  
Parent or Guardian

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

**To be signed by students 16 years of age or older if either driving or riding in a private vehicle to a school sponsored event.**

I acknowledge that the District will have no financial or legal responsibility for injuries arising out of my travel from school (or other location) to this activity. I further acknowledge that I have a responsibility to travel directly from school (or other location) to the activity and that failure to report to this activity on time may result in discipline, up to and including possible dismissal from this activity. I further acknowledge that inappropriate conduct during travel to this activity may result in such discipline, as well as additional discipline under Board of Education Policy, as such Policy applies to out-of-school misconduct.

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

**STUDENT EVALUATION  
LEWIS & CLARK CAREER CENTER  
2400 Zumbuhl Road  
St. Charles, MO 63301  
Phone (636)946-7726 Fax (636)946-8472**

Student	Employer	Supervisor	To Time Period Covered
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Please rate the student according to how well he/she performs the task or meets the specific objectives taking into consideration the amount of time or training received on the job.

**Ratings:**

1. Exceptional or superior performance.
2. Very good or above average performance.
3. Satisfactory or average performance.
4. Below average performance.
5. Unsatisfactory performance.
- N. Does not apply or I have not had a chance to observe as yet.

Dates absent or late: \_\_\_\_\_

\*Please call 723-4829 or 946-7726 on any days tardy or absent.

**Specific Rating (use above scale):**

- \_\_\_\_\_ 1. Does the student report to work at the scheduled time?
- \_\_\_\_\_ 2. Does the student notify you in case of illness with enough notice that you can get a replacement if needed?
- \_\_\_\_\_ 3. Does the student keep requests to be absent from work to a minimum and give adequate notice to the employer?
- \_\_\_\_\_ 4. Does the student attempt to get along well with other employees/customers?
- \_\_\_\_\_ 5. Does the student attempt to get along well with the employer?
- \_\_\_\_\_ 6. Does the student dress appropriately for work and is neat and clean about physical appearance?
- \_\_\_\_\_ 7. Does the student keep confidences concerning business procedure or operations?
- \_\_\_\_\_ 8. Does the student perform his/her task willingly?
- \_\_\_\_\_ 9. Does the student accept criticism graciously and then attempt to correct the problem?
- \_\_\_\_\_ 10. Does the student seek tasks to do when none are assigned?
- \_\_\_\_\_ 11. Does the student, in general, use common sense and is he/she conscientious about the welfare of the company?
- \_\_\_\_\_ 12. Does the student know and observe proper safety habits at all times?
- \_\_\_\_\_ 13. Does the student remain attentive at all times and follow all instructions given?
- \_\_\_\_\_ 14. Does the student correctly identify, use, and maintain hand tools, power tools, and equipment?
- \_\_\_\_\_ 15. Does the student perform his/her tasks and duties to the best of his/her ability and is willing to learn from coworkers?

Overall rating of student: \_\_\_\_\_

Comments: \_\_\_\_\_

# Lewis Clark Career Center

2005 - 2006 Placement Summary

Reese, Steve

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<b>Total Students:</b>	<b>26</b>	
<b>Total Placed:</b>	<b>25</b>	<b>96%</b>
<b>Total Placed Related:</b>	<b>12</b>	<b>46%</b>
<b>Positive MSIP Placement:</b>	<b>18</b>	<b>69%</b>

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<b>Employed Related:</b>	<b>7</b>	<b>27%</b>
<b>Employed Not Related:</b>	<b>7</b>	<b>27%</b>
<b>Military Related:</b>	<b>0</b>	<b>0%</b>
<b>Military Not Related:</b>	<b>0</b>	<b>0%</b>
<b>Continuing Education Related:</b>	<b>5</b>	<b>19%</b>
<b>Continuing Education Not Related:</b>	<b>6</b>	<b>23%</b>
<b>Not Available:</b>	<b>0</b>	<b>0%</b>
<b>Not Placed:</b>	<b>1</b>	<b>4%</b>
<b>Status Unknown (Not Found):</b>	<b>0</b>	<b>0%</b>

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## LEWIS & CLARK CAREER CENTER

### Enrollment, completions, and job placement

Enrollment data for each year is taken from the Core Data information compiled with the fourth Friday enrollment figures. Follow up is done 180 days after graduation. Lewis & Clark's placement coordinator contacts each exiter. Follow up information is gathered for each student who was officially enrolled in the program. Follow up information is not required for those students who drop out of school. Follow up data is compiled for Lewis & Clark by Statewide Job Placement.

## Enrollments, Completions, and Job Placement

### Secondary Category

<u>Year</u>	<u>Beginning Enrollment</u>	<u>Program Completers</u>	<u>Number employed In the automotive industry</u>	<u>Number enrolled in mfg. affiliated industry programs</u>	<u>Number enrolled in post secondary generic automotive programs</u>
1998-99	73	37	11	0	5
1997-98	71	39	16	0	14
1996-97	75	39	16	0	7

<i>Teacher Name</i>	<i>CIP Code</i>	<i>Number of Students</i>	<i>CENR</i>	<i>CER</i>	<i>ENR</i>	<i>ER</i>	<i>MNR</i>	<i>MR</i>
REESE	470604							
	Sum	28	7	7	3	7	2	2
Sum		28	7	7	3	7	2	2

Our Automotive Program has been certified by N.A.T.E.F. (National Automotive Technician Educational Foundation) as an ASE (Automotive Service Excellence) Certified educational facility. Strict guidelines have been met to certify the program in all eight areas of certification as defined by NATEF. Certification was first obtained in 1993. The program is re-evaluated every five years and has consistently retained certification since it was earned initially.

Certification is achieved by documenting the ability to teach the required competencies for students to be qualified for a position as an entry-level technician. Required competencies are determined by trained, qualified professionals across the country.

Documentation is available for viewing in the Auto Service Lab at Lewis and Clark Career Center. Please contact Mr. Reese or Mr. Lewis

AYES (Automotive Youth Educational Systems) has also accepted Lewis and Clarks automotive program as a qualified training facility.

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**APPLIED ACADEMIC &  
WORKPLACE SKILLS  
FOR  
AUTOMOBILE TECHNICIANS**



**National Automotive Technicians Education Foundation (NATEF)  
101 Blue Seal Drive, SE, Suite 101  
Leesburg, VA 20175**

**(703) 669-6650**

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**\* With 2002 task list**

*See  
NATEF  
Cert  
File*