



## **BAKER COLLEGE STUDENT LEARNING OUTCOMES**

### **AST 2110A Engine Repair II 4 Semester Hours**

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#### **Student Learning Outcomes & Enabling Objectives**

1. Apply engine diagnosis, removal and reinstallation (R & R) techniques
  - a. Remove engine on a newer vehicle equipped with OBD; reconnect all attaching components and restore the vehicle to running condition. P-3
  - b. Reinstall engine on a newer vehicle equipped with OBD; reconnect all attaching components and restore the vehicle to running condition. P-3
  
2. Demonstrate cylinder head and valve train diagnosis and repair techniques.
  - a. Inspect and replace camshaft and drive belt/chain; includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and valve timing components; verify correct camshaft timing. P-1
  - b. Establish camshaft position sensor indexing. P-1
  
3. Demonstrate engine block assembly diagnosis and repair techniques.
  - a. Remove, inspect, and/or replace crankshaft vibration damper (harmonic balancer). P-1
  - b. Disassemble engine block; clean and prepare components for inspection and reassembly. P1
  - c. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine needed action. P-2
  - d. Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine needed action. P-2
  - e. Deglaze and clean cylinder walls. P-2
  - f. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine needed action. P-3
  - g. Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage

- condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine needed action. P-1
- h. Inspect main and connecting rod bearings for damage and wear; determine needed action. P-2
  - i. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine needed action. P-3
  - j. Inspect and measure piston skirts and ring lands; determine needed action. P-2
  - k. Determine piston-to-bore clearance. P-2
  - l. Inspect, measure, and install piston rings. P-2
  - m. Inspect auxiliary shaft(s) (balance, intermediate, idler, counterbalance and/or silencer); inspect shaft(s) and support bearings for damage and wear; determine needed action; reinstall and time. P-2
  - n. Assemble engine block. P-1
4. Demonstrate lubrication and cooling systems diagnosis and repair techniques.
- a. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine needed action. P-1
  - b. Identify causes of engine overheating. P-1
  - c. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. P-1
  - d. Inspect and/or test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. P-1
  - e. Inspect, remove, and replace water pump. P-2
  - f. Remove and replace radiator. P-2
  - g. Remove, inspect, and replace thermostat and gasket/seal. P-1
  - h. Inspect and test fan(s), fan clutch (electrical or mechanical), fan shroud, and air dams; determine needed action. P-1
  - i. Perform oil pressure tests; determine needed action. P-1
  - j. Perform engine oil and filter change; use proper fluid type per manufacturer specification. P-1
  - k. Inspect auxiliary coolers; determine needed action. P-3
  - l. Inspect, test, and replace oil temperature and pressure switches and sensors. P-2
  - m. Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform needed action. P-2

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.

## Big Ideas

Engine diagnosis, removal, and reinstallation  
Cylinder head and valve train diagnosis and repair  
Engine block diagnosis and repair  
Lubrication and cooling systems diagnosis and repair

## Essential Questions

How do you perform diagnosis, removal, and repair of an engine?  
How do you diagnose and repair the cylinder head and valve train?  
How do you diagnose and repair the engine block?  
How do you diagnose and repair cooling system and use lubrication techniques in an auto service situation?

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These SLOs are not approved for experiential credit.

**Effective: Fall 2023**