



BAKER COLLEGE STUDENT LEARNING OUTCOMES

AST 1210A Suspension and Steering 4 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Apply general suspension and steering system diagnostic techniques.
 - a. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. (P-1)
 - b. Identify and interpret suspension and steering system concerns; determine needed action. (P-1)

2. Apply steering systems diagnosis and repair techniques.
 - a. Diagnose steering column noises, looseness, and binding concerns (including tilt/telescoping mechanisms); determine needed action. (P-2)
 - b. Diagnose steering column noises, looseness, and binding concerns (including tilt/telescoping mechanisms); determine needed action. (P-2)
 - c. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action. (P-2)
 - d. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action. (P-2)
 - e. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; determine needed action. (P-2)
 - f. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets. (P-2)
 - g. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed. (P-1)
 - h. Inspect power steering fluid level and condition. (P-1)
 - i. Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification. (P-2)
 - j. Inspect for power steering fluid leakage; determine needed action. (P-1)
 - k. Remove, inspect, replace, and/or adjust power steering pump drive belt. (P-1)

- l. Remove and reinstall power steering pump. (P-2)
 - m. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment. (P-2)
 - n. Inspect, remove and/or replace power steering hoses and fittings. (P-2)
 - o. Inspect, remove and/or replace pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper. (P-2)
 - p. Inspect, replace, and/or adjust tie rod ends (sockets), tie rod sleeves, and clamps. (P-1)
 - q. Inspect, test and diagnose electrically- assisted power steering systems (including using a scan tool); determine needed action. (P-2)
 - r. Identify hybrid vehicle power steering system electrical circuits and safety precautions. (P2)
 - s. Test power steering system pressure; determine needed action. (P-2)
3. Apply suspension systems diagnosis and repair techniques.
- a. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine needed action. (P-1)
 - b. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine needed action. (P-1) c
 - c. Inspect, remove, and/or replace upper and lower control arms, bushings, shafts, and rebound bumpers. (P-3)
 - d. Inspect, remove, and/or replace strut rods and bushings. (P-3)
 - e. Inspect, remove, and/or replace upper and/or lower ball joints (with or without wear indicators). (P-2)
 - f. Inspect, remove, and/or replace steering knuckle assemblies. (P-3)
 - g. Inspect, remove and/or replace short and long arm suspension system coil springs and spring insulators. (P-3)
 - h. Inspect, remove, and/or replace torsion bars and mounts. (P-3)
 - i. Inspect, remove, and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links. (P-3)
 - j. Inspect, remove, and/or replace strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. (P-3)
 - k. Inspect, remove, and/or replace track bar, strut rods/radius arms, and related mounts and bushings. (P-3)
 - l. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. (P-1)
4. Apply related suspension and steering service techniques.
- a. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. (P-1)
 - b. Remove, inspect, service and/or replace front and rear wheel bearings. (P-1)

- c. Describe the function of suspension and steering control systems and components, (i.e. active suspension and stability control). (P-3)
5. Apply wheel alignment diagnosis, adjustment, and repair.
 - a. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine needed action. (P-1)
 - b. Perform prealignment inspection; measure vehicle ride height; determine needed action. (P-1)
 - c. Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and toe as required; center steering wheel. (P-1)
 - d. Check toe-out-on-turns (turning radius); determine needed action. (P-2)
 - e. Check steering axis inclination (SAI) and included angle; determine needed action. (P-2)
 - f. Check rear wheel thrust angle; determine needed action. (P-1)
 - g. Check for front wheel setback; determine needed action. (P-2)
 - h. Check front and/or rear cradle (subframe) alignment; determine needed action. (P-3)
 - i. Reset steering angle sensor. (P-2)
6. Apply wheels and tires diagnosis and repair.
 - a. Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label. (P1)
 - b. Diagnose wheel/tire vibration, shimmy, and noise; determine needed action. (P-2)
 - c. Rotate tires according to manufacturer's recommendation including vehicles equipped with tire pressure monitoring systems (TPMS). (P-1)
 - d. Measure wheel, tire, axle flange, and hub runout; determine needed action. (P-2)
 - e. Diagnose tire pull problems; determine needed action. (P-1)
 - f. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly. (P-1)
 - g. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor. (P-1)
 - h. Inspect tire and wheel assembly for air loss; perform needed action. (P-1)
 - i. Repair tire following vehicle manufacturer approved procedure. (P-1)
 - j. Identify indirect and direct tire pressure monitoring system (TPMS); calibrate system; verify operation of instrument panel lamps. (P-1)
 - k. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure. (P-1)

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

General suspension and steering system diagnostic techniques

Suspension system repair techniques

Steering system repair techniques

Related suspension and steering services

Wheel alignment

Wheel and tire diagnosis and repair

Essential Questions

1. What techniques do you use for general suspension and steering diagnosis?
2. How do you perform steering system diagnosis and repair?
3. How do you perform suspension system diagnosis and repair?
4. Why do you perform related suspension and steering techniques?
5. How do you perform wheel alignment diagnosis, adjustment, and repair?
6. How to you perform wheels and tires diagnosis and repair?

These SLOs are not approved for experiential credit.

Effective: Fall 2023