

A5 Brakes

Grades 9-12

Refer to NATEF (National Automotive Technicians Education Foundation) standards.

A5 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	Priority	AYES	AYES	AYES
		Pre	YR2	Job Sheet
		Intern		
A. General Brake Systems Diagnosis				
1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1		A5/U4/L1	A5A01
2. Identify and interpret brake system concern; determine necessary action.	P-1		A5/U4/L1	A5A01
3. Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.	P-1		A5/U4/L1	A5A03
4. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).	P-1		A5/U4/L1	A5A04
B. Hydraulic System Diagnosis and Repair				
1. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	P-1		A5/U4/L1	A5B01
2. Measure brake pedal height; determine necessary action.	P-2		A5/U4/L2	A5B02

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3. Check master cylinder for internal and external leaks and proper operation; determine necessary action.	P-2	A5/U5/L1	A5B03 9F	
4. Remove, bench bleed, and reinstall master cylinder.	P-1	A5/U5/L1	A5B04	
5. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.	P-1	A5/U4/L1	A5B05	
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	A5/U4/L2	A5B06 34B	
7. Fabricate and/or install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed.	P-2	A5/U5/L2	A5B07	
8. Select, handle, store, and fill brake fluids to proper level.	P-1	A5/U3/L1	A5B08	
9. Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.	P-2	A5/U5/L3	A5B09	
10. Inspect, test, and adjust height (load) sensing proportioning valve.	P-3	A5/U5/L3	A5B10	
11. Inspect, test, and/or replace components of brake warning light system.	P-3	A5/U4/L2	A5B11	
12. Bleed (manual, pressure, vacuum or surge) brake system.	P-1	A5/U3/L2	A5B12	
13. Flush hydraulic system.	P-3	A5/U3/L2	A5B13	

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C. Drum Brake Diagnosis and Repair

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| 1. | Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. | P-1 | A5/U4/L1 | A5C01 |
| 2. | Remove, clean (using proper safety procedures), inspect, and measure brake drums; determine necessary action. | P-1 | A5/U7/L1 | A5C02 |
| 3. | Refinish brake drum. | P-1 | A5/U7/L1 | A5C03 |
| 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 | A5/U7/L1 | A5C04 |
| 5. | Remove, inspect, and install wheel cylinders. | P-2 | A5/U7/L1 | A5C05 |
| 6. | Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings. | P-1 | A5/U7/L1 | A5C06 |
| 7. | Install wheel, torque lug nuts, and make final checks and adjustments. | P-1 | A5/U7/L1 | A5C06 |

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D. Disc Brake Diagnosis and Repair

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|----|--|-----|----------|-------|
| 1. | Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. | P-1 | A5/U4/L1 | A5D01 |
| 2. | Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action. | P-1 | A5/U6/L1 | A5D02 |
| 3. | Clean and inspect caliper mounting and slides for wear and damage; determine necessary action. | P-1 | A5/U6/L1 | A5D03 |
| 4. | Remove, clean, and inspect pads and retaining hardware; determine necessary action. | P-1 | A5/U6/L1 | A5D04 |
| 5. | Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. | P-2 | A5/U6/L1 | A5D05 |
| 6. | Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks. | P-1 | A5/U6/L1 | A5D06 |
| 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 | A5/U6/L2 | A5D07 |
| 8. | Remove and reinstall rotor. | P-1 | A5/U6/L2 | A5D08 |

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| 9. Refinish rotor on vehicle. | P-1 | A5/U6/L2 | A5/U6/L2 | A5D09 |
| 10. Refinish rotor off vehicle. | P-1 | A5/U6/L2 | A5/U6/L2 | A5D10 |
| 11. Adjust calipers equipped with an integrated parking brake system. | P-3 | A5/U6/L1 | A5/U6/L1 | A5D11 |
| 12. Install wheel, torque lug nuts, and make final checks and adjustments. | P-1 | A5/U7/L2 | A5/U7/L2 | A5C06 |

E. Power Assist Units Diagnosis and Repair

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|---|-----|----------|----------|-------|
| 1. Test pedal free travel with and without engine running; check power assist operation. | P-2 | A5/U8/L1 | A5/U8/L1 | A5E01 |
| 2. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. | P-2 | A5/U8/L1 | A5/U8/L1 | A5E01 |
| 3. Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action. | P-2 | A5/U8/L1 | A5/U8/L1 | A5E01 |
| 4. Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action. | P-3 | A5/U8/L2 | A5/U8/L2 | A5E04 |
| 5. Measure and adjust master cylinder pushrod length. | P-3 | A5/U8/L1 | A5/U8/L1 | A5E01 |

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

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|----|--|-----|----------------------|--------------|
| 1. | Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. | P-1 | A5/U4/L2 | A5F01 |
| 2. | Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings. | P-1 | A5/U4/L2 | A5F02 |
| 3. | Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, or replace as needed. | P-2 | A5/U4/L2
A5/U7/L1 | A5F03 |
| 4. | Check parking brake operation; determine necessary action. | P-1 | A5/U4/L2
A5/U7/L1 | A5F04
NEW |
| 5. | Check operation of parking brake indicator light system. | P-3 | | |
| 6. | Check operation of brake stop light system; determine necessary action. | P-1 | A5/U5/L3 | A5F06 |
| 7. | Replace wheel bearing and race. | P-1 | A5/U4/L2 | A5F07 |
| 8. | Inspect and replace wheel studs. | P-1 | A5/U4/L3 | A5F08 |
| 9. | Remove and reinstall sealed wheel-bearing assembly. | P-2 | A5/U4/L3 | A5F09 |

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G. Antilock Brake and Traction Control Systems

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|----|--|-----|----------|--------------|
| 1. | Identify and inspect antilock brake system (ABS) components; determine necessary action. | P-1 | A5/U9/L1 | A5G01 |
| 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 | A5/U9/L1 | A5G02 |
| 3. | Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action. | P-1 | A5/U9/L2 | A5G03 |
| 4. | Depressurize high-pressure components of the antilock brake system (ABS). | P-3 | A5/U9/L2 | A5G04
NEW |
| 5. | Bleed the antilock brake system's (ABS) front and rear hydraulic circuits. | P-2 | A5/U9/L2 | A5G05 |
| 6. | Remove and install antilock brake system (ABS) electrical/electronic and hydraulic components. | P-3 | A5/U9/L2 | A5G06 |
| 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 | A5/U9/L1 | A5G07 |

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8. Diagnose antilock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).

P-3 A5/U9/L1 A5G09 TEST

9. Identify traction control/vehicle stability control system components.

P-3 A5/U2/L4 A5G09