



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.

A. General Brake Systems Diagnosis		
1.	Identify and interpret brake system concern; determine necessary action.	P-1
2.	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
3.	Describe procedure for performing a road test to check brake system operation; including an anti-lock brake system (ABS).	P-1
4.	Install wheel and torque lug nuts.	P-1
B. Hydraulic System Diagnosis and Repair		
1.	Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	P-1
2.	Measure brake pedal height, travel, and free play (as applicable); determine necessary action.	P-1
3.	Check master cylinder for internal/external leaks and proper operation; determine necessary action.	P-1
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-3
6.	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging and wear; check for loose fittings and supports; determine necessary action.	P-1
7.	Replace brake lines, hoses, fittings, and supports.	P-2
8.	Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).	P-2
9.	Select, handle, store, and fill brake fluids to proper level.	P-1
10.	Inspect, test, and/or replace components of brake warning light system.	P-3
11.	Identify components of brake warning light system.	P-2
12.	Bleed and/or flush brake system.	P-1
13.	Test brake fluid for contamination.	P-1



C. Drum Brake Diagnosis and Repair		
1.	Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	P-1
2.	Remove, clean, inspect, and measure brake drum diameter; determine necessary action.	P-1
3.	Refinish brake drum and measure final drum diameter; compare with specifications.	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.	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.	P-2
6.	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.	P-2

D. Disc Brake Diagnosis and Repair		
1.	Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.	P-1
2.	Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.	P-1
3.	Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action.	P-1
4.	Remove, inspect and replace pads and retaining hardware; determine necessary action.	P-1
5.	Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.	P-1
6.	Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.	P-1
7.	Remove and reinstall rotor.	P-1
8.	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.	P-1
9.	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.	P-1
10.	Retract and re-adjust caliper piston on an integrated parking brake system.	P-3
11.	Check brake pad wear indicator; determine necessary action.	P-2
12.	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's	P-1



recommendations.		
E. Power Assist Units Diagnosis and Repair		
1. Check brake pedal travel with, and without, engine running to verify proper power booster operation.	P-2	
2. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.	P-1	
3. Inspect vacuum-type power booster unit for leaks; inspect the check-valve for proper operation; determine necessary action.	P-1	
4. Inspect and test hydraulically-assisted power brake system for leaks and proper operation; determine necessary action.	P-3	
5. Measure and adjust master cylinder pushrod length.	P-3	
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-3	
2. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.	P-1	
3. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.	P-2	
4. Check parking brake operation and parking brake indicator light system operation; determine necessary action.	P-1	
5. Check operation of brake stop light system.	P-1	
6. Replace wheel bearing and race.	P-2	
7. Remove and reinstall sealed wheel bearing assembly.	P-2	
8. Inspect and replace wheel studs.	P-1	
G. Electronic Brake, Traction and Stability Control Systems Diagnosis and Repair		
1. Identify and inspect electronic brake control system components; determine necessary action.	P-1	
2. Identify traction control/vehicle stability control system components.	P-3	
3. Describe the operation of a regenerative braking system.	P-3	
4. Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system; determine necessary action.	P-2	
5. Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.	P-2	



6.	Depressurize high-pressure components of an electronic brake control system.	P-3	
7.	Bleed the electronic brake control system hydraulic circuits.	P-1	
8.	Test, diagnose, and service electronic brake control system speed sensors (digital and analog), 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-3	
9.	Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, cub height, final drive ratio, etc.).	P-3	