Brake System

Symptom Chart(s)

Symptom Chart: Brake System

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Condition	Possible Sources	Actions
The red brake warning indicator and the yellow ABS warning indicator are illuminated	Diagnostic Trouble Codes (DTCs) in the ABS	CHECK for REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing). diagnostic trouble codes (DTCs).
The red brake warning indicator is always/never on	• Brake fluid level switch • Parking brake switch • Wiring, terminals or connectors • IPC • BCM	REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).
Vehicle pulls or drifts during braking	• Brake calipers and/or guide pins • Wheel cylinders and/or brake shoe hardware • Brake flexible hose • Brake pads • Brake discs	INSPECT the brake system components. INSTALL new components as necessary.
	Tires	REFER to: Wheels and Tires (204-04A Wheels and Tires, Diagnosis and Testing).
	Suspension component(s) and/or wheel alignment	REFER to: Suspension System (204-00 Suspension System - General Information, Diagnosis and Testing).
Brake pedal goes down fast or eases down slowly	Brake fluid leaks and/or air in the system	INSPECT the system for leaks. REPAIR as necessary. BLEED the system. REFER to: Brake System Pressure Bleeding (206-00 Brake System - General Information, General Procedures).
	Brake master cylinder	CARRY OUT the Brake Master Cylinder -

		Bypass Condition Component Test.
	HCU	REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).
Brakes lock up under light brake pedal force	• Brake pads • Brake flexible hose • Brake discs • Brake calipers and/or guide pins • Wheel cylinders and/or brake shoe hardware	INSPECT the brake system components. INSTALL new components as necessary.
	ABS	REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).
Excessive brake pedal travel (low/spongy pedal)	Brake fluid leaks and/or air in the system	INSPECT the system for leaks. REPAIR as necessary. BLEED the system. REFER to: Brake System Pressure Bleeding (206-00 Brake System - General Information, General Procedures).
	Brake master cylinder	CARRY OUT the Brake Master Cylinder - Bypass Condition Component Test.
	Brake calipers and/or guide pins	INSPECT the brake calipers and guide pins. INSTALL new components as necessary.
	Brake flexible hose	INSPECT the brake flexible hoses during brake application. INSTALL a new brake hose as necessary. REFER to: Front Brake Flexible Hose (206-03 Front Disc Brake, Removal and Installation). REFER to: Rear Brake Inner Flexible Hose (206-04 Rear Disc Brake, Removal and Installation).
Erratic brake pedal travel	Brake pedal	INSPECT the brake pedal for binding, obstructions and correct interface to booster rod. REPAIR as necessary. CHECK the brake pedal fasteners for correct torque. REFER to: Brake Pedal and Bracket (206-06 Hydraulic Brake Actuation, Removal and Installation).
	ABS	REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).
Brake drag	Parking brake component	INSPECT the parking brake system. REFER to: Parking Brake (206-05 Parking Brake and Actuation, Diagnosis and Testing).
	• Incorrect brake shoe	INSPECT the brake system components.

	and/or parking brake cable adjustment • Wheel cylinder(s) • Brake caliper and/or guide pins • Brake flexible hose • Brake booster	INSTALL new components as necessary.
	Brake master cylinder	CARRY OUT the Brake Master Cylinder - Compensator Port Component Test.
	HCU	REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).
	Stoplamp switch	VERIFY correct installation of the stoplamp switch. REFER to: Stoplamps (417-01 Exterior Lighting, Diagnosis and Testing).
Excessive brake pedal effort	• Insufficient vacuum for brake booster operation • Brake booster manifold vacuum hose • Brake booster • Brake booster check valve • Brake booster vacuum pump	CARRY OUT the Brake Booster Component Test in this section.
	Brake pads	INSPECT the brake pads and, if equipped, the brake shoes. INSTALL new components as necessary. REFER to: Brake Pads (206-03 Front Disc Brake, Removal and Installation). REFER to: Brake Pads (206-04 Rear Disc Brake, Removal and Installation).

Symptom Chart: NVH

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Condition	Possible Sources	Actions
Vibration when the brakes are applied	• Brake disc(s) • Suspension components	GO to Pinpoint Test A
Brake vibration/shudder occurs when the brake	Brake drag	REFER to Symptom Chart: Brake System

pedal is released		
Rattling noise	• Caliper guide pins or guide pin bolts • Missing or damaged anti-rattle clips or springs • Loose brake disc shield • Missing or damaged brake shoe hardware	• INSPECT the caliper guide pins and guide pin bolts. INSTALL new components as necessary. • INSPECT the brake pads for missing clips or broken springs. INSTALL new components as necessary. • TIGHTEN the brake disc shield bolts to specification. REFER to: Brake Disc Shield (206-03 Front Disc Brake, Removal and Installation). REFER to: Brake Disc Shield (206-04 Rear Disc Brake, Removal and Installation). • CHECK the brake shoes for missing or broken hardware. INSTALL new components as necessary.
Squealing noise - occurs on first (morning) brake application	Brake pads	Acceptable condition. Caused by humidity and low brake pad temperature.
Squealing noise - a continuous squeal	Brake pads	INSPECT the brake pads. INSTALL new components as necessary. REFER to: Brake Pads (206-03 Front Disc Brake, Removal and Installation). REFER to: Brake Pads (206-04 Rear Disc Brake, Removal and Installation).
Squealing noise - an intermittent squeal	Brake pads	Acceptable condition. Caused by cold, heat, water, mud or snow.
Groaning noise - occurs at low speeds with brake lightly applied (creeping)	Brake pads	Acceptable condition.
Grinding/moaning noise - continuous	• Brake pads • Brake disc	INSPECT the brake pads, brake shoes, brake discs and attaching hardware for damage. VERIFY brake components are within specifications. INSTALL new components as necessary. REFER to: Brake Pads (206-03 Front Disc Brake, Removal and Installation). REFER to: Brake Pads (206-04 Rear Disc Brake, Removal and Installation). REFER to: Brake Disc (206-03 Front Disc Brake, Removal and Installation). REFER to: Brake Disc (206-04 Rear Disc Brake, Removal and Installation).

Pinpoint Tests

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

▶ **PINPOINT TEST A : VIBRATION WHEN BRAKES ARE APPLIED**

Component Test- Brake Booster

1. Disconnect the brake booster vacuum sensor/check valve from the brake booster and connect a suitable vacuum/pressure tester to the booster side of the vacuum sensor/check valve.

2. Apply the parking brake, start the engine and place the transmission in NEUTRAL.
   - Allow the engine to reach normal operating temperature.

3. Verify that vacuum is available at the vacuum sensor/check valve with engine running at normal idle speed.
   - The vacuum gauge should read between 51-74 kPa (15-22 in-Hg).
   - If specified vacuum is available, stop the engine, connect the vacuum sensor/check valve and continue with Step 5.
   - If specified vacuum is not available, continue with Step 4.

4. Disconnect the vacuum sensor/check valve from the vacuum hose and verify that the specified vacuum is available at the hose with the engine at idle speed and the transmission in NEUTRAL.
   - If specified vacuum is available, stop the engine, install a new check valve and continue with Step 5.
   - For vehicles equipped with a brake vacuum pump, if specified vacuum is not available, inspect the vacuum hose and install new as necessary. If the vacuum hose is OK, install a new vacuum pump.
   - For vehicles not equipped with a brake vacuum pump, if specified vacuum is not available, stop the engine, connect the vacuum hose to the check valve and diagnose the no/low vacuum condition. Carry out the Intake Manifold Vacuum Test.
     REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).

5. Apply the brake pedal several times to exhaust all vacuum from the system.

6. Apply the brake pedal and hold it in the applied position. Start the engine and verify that the brake pedal moves downward after the engine starts.
   - If the brake pedal moves, the brake booster is operating correctly.
   - If the brake pedal does not move, install a new brake booster.
     REFER to: Brake Booster (206-07 Power Brake Actuation, Removal and Installation).

7. Operate the engine a minimum of 20 seconds at idle. Stop the engine and let the vehicle stand for 10 minutes, then apply the brake pedal. The brake pedal feel should be the same as that noted with the engine operating.
   - If the brake pedal feels hard (no power assist), install a new brake booster vacuum sensor/check valve and retest.
   - If condition still exists, install a new brake booster.
     REFER to: Brake Booster (206-07 Power Brake Actuation, Removal and Installation).

   - If the brake pedal feels the same as noted with the engine operating, the vacuum sensor/check valve is functioning properly.

Component Test - Brake Master Cylinder - Bypass Condition

1. Inspect the master cylinder.

2. Disconnect the brake tubes from the master cylinder.

3. **NOTE:** *Make sure the outlet port plugs do not show signs of leakage.*

   Plug the outlet ports of the master cylinder.

4. Lightly apply the brakes and hold for 10 seconds. Release the brakes and then reapply with heavy force. If brake pedal height cannot be maintained, the brake master cylinder has an internal leak and a new brake master cylinder must be installed.

- If brake pedal height is maintained, reinstall brake tubes and tighten to specifications.
  REFER to: Specifications (206-00 Brake System - General Information, Specifications).
  REFER to: Brake Master Cylinder (206-06 Hydraulic Brake Actuation, Removal and Installation).
  After installation, bleed the brake system. REFER to: Brake System Pressure Bleeding (206-00 Brake System - General Information, General Procedures).

Component Test - Brake Master Cylinder - Compensator Port

1. Inspect the master cylinder.

2. REFER to: Jacking and Lifting (100-02 Jacking and Lifting, Description and Operation).

3. Apply and release the brakes.

4. With the brakes released, attempt to rotate each wheel and check for any brake drag.

- If an excessive amount of brake drag exists at multiple wheels, continue to Step 5.
- If an excessive amount of brake drag exists at only one wheel, it indicates a possible seized brake caliper, brake wheel cylinder or parking brake component. Repair or install new components as necessary.

5. Check the brake stoplamp switch and the brake pedal free play to verify the brake pedal is not partially applied.

6. Loosen the brake master cylinder nuts and position the brake master cylinder away from the brake booster.

7. With the brakes released, attempt to rotate each wheel and check for any brake drag.

- If the brake drag is no longer present, install a new brake booster.
  REFER to: Brake Booster (206-07 Power Brake Actuation, Removal and Installation).
- If the brake drag is still present, install a new master cylinder.
  REFER to: Brake Master Cylinder (206-06 Hydraulic Brake Actuation, Removal and Installation).