



Disk Brake System Analyzer

NOTE!

The Disc Brake Analyzer diagnoses and tests disc brake operations and efficiency. There is no pressure chart available because caliper pressure is relative to the weight mass and pressure applied to the brake peddle which is not repeatable. Rather than looking for a specific pressure number, look for brake pressure imbalance that can cause uneven brake ware.

The Disc Brake Analyzer is factory sealed; removing the gauge from the tool or use other then what it was designed for voids the warranty.

Tests:

- STICKY BRAKE CALIPER PISTONS
- STICKY BRAKE CALIPER SLIDES
- AIR IN THE HYDRAULIC SYSTEM
- PROPORTIONING VALVE OPERATIONS
- IMPODED (RESTRICTED INTERNALLY) FLEXIBLE BRAKE HOSES
- BYPASSING OR INTERNALLY LEAKING MASTER CYLINDERS
- REAR LINING TO DRUM INCORRECT ADJUSTMENT
- UNEVEN BRAKE PAD WEAR

INSTRUCTIONS

Before installing the Disc Brake Analyzer:

- 1) Determine the type of brake system that is used on the vehicle. The two major types are: (1) split diagonal and (2) split front to rear. This is a necessary step so you follow the correct repair procedures after obtaining test results.
- 2) Determine if the disc brake pads are of the type that can be removed without removing the caliper/caliper bracket or if removal of the caliper is necessary, remove the disc brake pads.
- 3) Zero the red pressure tell tail needle on each gauge by turning the center knob to the left until the red needle just contacts the black needle at 0 psi.

INITIAL TESTING

1. On both front wheels, remove the inner disc brake pad and install the load cell (the rectangular end) of the Disc Brake Analyzer place of the inner pad. Be sure to have the raised round load cell piston facing away from the brake caliber piston and centered on the disc brake caliper piston. Depending on the diameter and style of piston, it may be necessary to place a shim such as the metal portion of a worn disc pad between the piston and the Disc Brake Analyzer.

2. After installing the Disc Brake Analyzer on both front brake calipers, apply and release the brake pedal in the vehicle by using a moderate amount of pressure (similar to normal braking) on the brake pedal and note the pressure readings that are obtained. The pressure readings are recorded by the red needle on each gauge. The red tell tail needle remains at the high pressure reading recorded on each gauge.

Initial Analysis:

1. FRONT TO REAR SPLIT BRAKE SYSTEMS

- (a) On a front to rear split brake system, frozen, sticking or restricted movement of the disc brake caliper pistons will show as unequal pressure readings on one of the two Disc Brake Analyzers.
- (b) On front to rear split systems, both front wheels may show pressures less than expected if air is in the system. Because hydraulic pressure is equal in all parts of a closed system, the result will be a low pedal. This may cause insufficient stroke to obtain normal pressures on both wheels.

2. SPLIT DIAGONAL SYSTEMS

- (a) On a split diagonal brake system, a pressure difference between the two front wheels may mean a sticking disc brake piston, a proportioning valve problem or air is in the system.
- (b) You may notice a considerable difference in side to side pressure readings on split diagonal systems if air is in one half of the system. If a pressure difference is noted on the initial readings, bleed the side with the lower reading and retest before performing any additional testing.

3. ALL SYSTEMS

- (a) Imploded flexible brake hoses will cause the black needle on the pressure to not return to zero position immediately after releasing the brake pedal in the vehicle. Note—the black needle may initially show some “held” pressure and then bleed off to zero a short time later. This is an indication of a problem. The black needle should immediately return to zero after releasing the brake pedal. Sticky calipers will also cause the black gauge needle to not return to 0 psi after the brake pedal has been released. To determine which condition is occurring, do the following: After releasing the pedal, crack open the bleeder nipple on the caliper. If the pressure returns to 0 psi on

the Disc Brake Analyzer this means the piston is moving freely and the brake hose is imploded. If the pressure on the Disc Brake Analyzer remains "held" above 0 psi this indicates the caliper piston is sticking.

- (b) Low pressure on initial application of one or both gauges and low or sinking brake pedal may indicate that the master cylinder is bypassing internally.
- (c) Low pressure on one or both gauges may indicate excessive rear lining to drum clearance. If pressures are low, hold moderate pressure on the brake pedal and apply the parking brake. Have an assistant observe the gauges. If the pressure readings increase when the parking brake is applied, the most likely cause is incorrect rear lining to drum clearance.

Advanced Analysis:

1. Integral ABS systems use the two pistons of the master cylinder for the front brakes. The rear brakes are controlled by the accumulator based pressure. If unequal brake pressure readings are recorded, frozen or sticking caliper pistons, worn or bypassing master cylinder seals or air in the system may be the problem. Rear lining clearance should not affect the readings on this type of ABS brake system.
2. Most Add on ABS systems use conventional master cylinders and usually use a split diagonal brake system in the non-ABS mode. On these systems the same diagnostics used in the first approach may be used.
3. If a vehicle has air trapped in line in an add on ABS brake system, it may experience a low brake pedal but show near normal pressures on the Disc Brake Analyzer. The add on ABS brake modulator valve assemblies have a normally open inlet valve, which allows brake fluid to pass through and apply the brakes. The unit's outlet valve for each wheel is normally closed. If the unit is allowed to run dry during brake service or because of loss of fluid, air may be trapped in the modulator valve assembly. It will be impossible on some systems to remove this trapped air without cycling the valve (outlet valve). This may require special equipment. This condition of having air trapped in the modulator may be diagnosed by the near normal pressures but a low pedal which will pump up slightly.
4. On trucks with rear anti-lock brake systems, if low pedal is experienced but the pressure on the Disc Brake Analyzer is normal, plug off the rear brake lines at the master cylinder and retest. If the pedal height returns to normal, connect the combination line to the master cylinder and plug off the outlet of the combination valve. If pedal height is still low, the vehicle

has a bad combination valve. If pedal height is normal, connect the line to the rear ABS valve from the combination valve and plug off the outlet from the ABS valve. If the pedal height is now again low, the problem is mostly likely a leaking accumulator in the rear ABS valve (Electro-Hydraulic Valve, EH Valve, RWAL, RABS).

5. On Integral ABS systems with 4 wheel disc brakes, you will see the following on the Disc Brake Analyzer.
 - (a) Normal pressure on the Disc Brake Analyzer when installed in the front, even after pumping the pedal 20 to 30 times with the key off indicates a depleted boost assist and accumulator pressure. However, you must remember that master cylinder pistons supply the front brakes at all times. A high hard pedal will be present but you will still have front brakes even with the key off.
 - (b) With the system charged (accumulator charged), turn the key off. Install the Disc Brake Analyzer the rear calipers and pump the brakes. As long as you have power assist, you should show pressure to the rear caliper pads. When the accumulator pressure is depleted, you will lose power assist and rear brake pressure at the same time. The key must be off. Approximately 20 to 30 applications will deplete the pressure.

TROUBLESHOOTING CHART

INDICATION	Possible Cause	Action
Un even pressure reading on gauges.	1. Rear Brake adjustment 2. Stuck Proportioning valve Frozen Caliper Piston or Slide	1. Adjust Rear Drum Brakes 2. Replace Proportioning Valve 3. Replace Brake Caliper
Needle drops slowly.	1. Imploded Brake Hose. 2. Frozen Brake Caliper	If the gauge needle drops slowly open the bleeder, valve, if the needle then drops quickly the brake hose is imploded and should be replaced. If the needle still hangs when the bleeder is open, replace the caliper.
Pressure Readings are low but even.	1) Both rear drum brakes are badly out of adjustment. 2) Bad Master Cylinder. 3) Bad Power Booster 4) ABS System in need of repair	1. Adjust Rear Brakes. 2. Test and replace Master Cylinder. 3. Test, repair or replace power booster. 4. Test and repair ABS system.