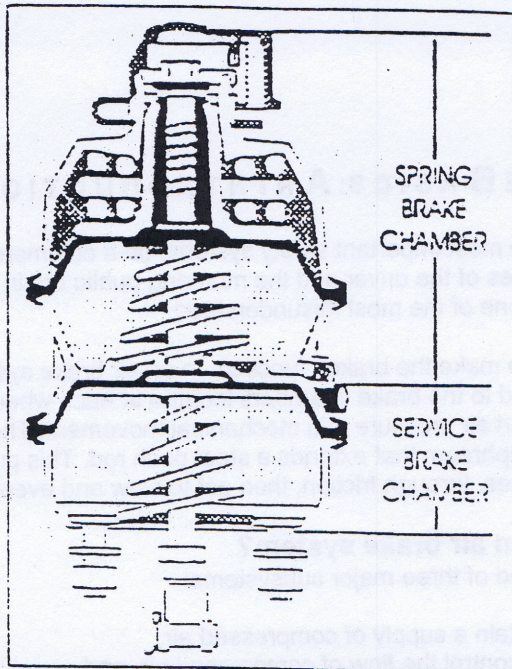


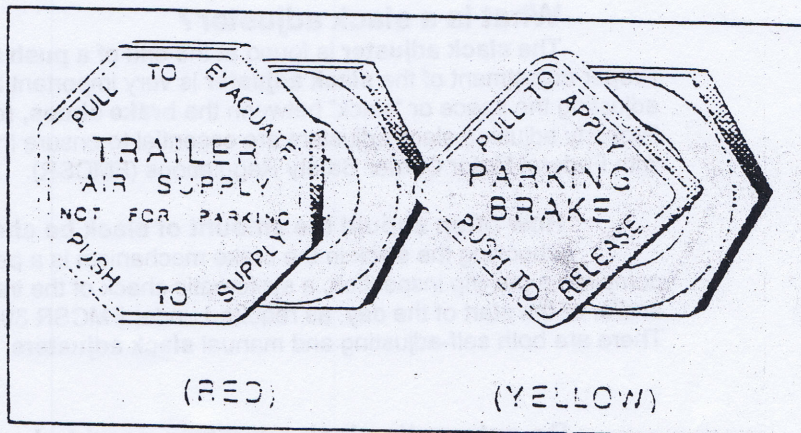
This is the type of brake chamber you'll find on tractor drive wheels and trailer wheels. The front steering axles will have only the service brake chamber.



*Spring Applied.  
Air Released* } *PARKING BRAKE*

*Air Applied.  
Spring Released* } *Service Brake.*

Dash mounted push-pull air control valve knobs. The trailer air supply knob is red, the parking brake knob is yellow.





# AIR BRAKE BASICS: AN INTRODUCTION

The braking system is one of the most important safety systems on a commercial vehicle. Without a properly functioning brake system, the lives of the driver and the motoring public are in danger. While it is one of the most important systems, it is also one of the most misunderstood.

Air brakes use compressed air to make the brakes function. In an air brake system, air is stored under pressure and then delivered upon demand to the brake chambers located at each wheel or set of wheels. The function of the brake chamber is to convert air pressure into mechanical movement. The increase in pressure in the brake chamber displaces a rubber diaphragm that extends a steel push rod. This push rod ultimately activates the brakes. The foundation brakes, through friction, then act to slow and eventually stop the wheels.

## What elements compose an air brake system?

The air brake system is composed of three major subsystems:

- Components that maintain a supply of compressed air,
- Valves that direct and control the flow of compressed air, and
- Mechanical parts that transfer the energy of the compressed air into the mechanical force and motion necessary to stop or slow the vehicle.

## What is a slack adjuster?

The **slack adjuster** is found at the end of a **push rod** that is, in turn, attached to the **brake chamber**. Proper adjustment of the **slack adjuster** is very important because the **slack adjuster** is responsible for adjusting the space or "slack" between the **brake shoes, (or linings)** and the **brake drum**. Properly adjusted slack adjusters are essential to ensure the safe stopping ability of the vehicle and to comply with Federal Motor Carrier Safety Regulations (FMCSR).

## How often should the amount of slack be checked?

Checking the slack in the brake mechanism is a part of a pre-trip inspection. A driver is required to complete a pre-trip inspection, a systematic check of the tractor-trailer's parts and systems, before every trip and/or at the start of the day, as required under FMCSR 392.7. There are both self-adjusting and manual **slack adjusters**.

## Do automatic slack adjusters need to be inspected during the pre-trip inspection?

Yes. Every **slack adjuster**, whether manual or self adjusting, must be inspected as part of the pre-trip. A large number of out of service violations for out-of-adjustment brakes are for self-adjusting **slack adjusters**.

## What is brake lag?

Brake lag is the time required for air to pass through the air brake system before braking actually begins. It is important to include brake lag when calculating stopping distances for air-braked vehicles.

## Why are there two air lines going to the trailer?

The tractor's air brake system is connected to the trailer's system by two air lines. All air brake systems have to comply with Federal Motor Vehicle Safety Standards which require a dual circuit brake system. In the event of a leak or failure, emergency braking function is maintained.

The **emergency line** ( - also called the supply line) carries compressed air from the tractor to the trailer to fill the **reservoirs** (air storage tanks located at each trailer axle).

In addition, the air supplied through the **emergency line** is used to deactivate the **spring brakes**.

The **spring brake** is simply a large spring incorporated into a second brake chamber "piggybacked" on the service brake chamber. It is a "fail safe" brake that locks up on loss of air pressure.



The **service** line (blue - also called the control line) is used to send a pressure signal to the trailer brake valve to open and allow compressed air from the **reservoir** to activate the trailer brakes.

**What happens if one of the trailer air lines gets cut or becomes disconnected?**

In an emergency where the **emergency** (supply) air line pressure drops to between 20 & 45 *psi* (pounds per square inch), the **tractor protection valve** is activated which closes off the air supply to the trailer. The lack of air pressure activates the **spring brakes** on the trailer, stopping the vehicle with no further driver action. Tractors and trailers equipped with air brakes have at least one axle equipped with **spring brakes**; on the tractor, *it must be a non-steer axle*.

If the **service** (control) line gets disconnected, there will be no indication to the driver that he has a problem until he steps on the brake pedal (sometimes called the foot valve, or treadle valve). When he does, he will realize that he is losing air every time he pushes the brake pedal. The driver can maintain air pressure in the tractor for a short time by using the brakes as sparingly as possible as he brings his vehicle to a controlled stop.