

# Important Notes About Self-Adjusting Brakes

## Why It Is So Important To Check Your Air Brake Chamber (or Actuator) Pushrod Stroke?

In summary, when you have S-ABAs that exhibit chamber stroke beyond the regulation limit, consider the following facts before you try adjusting the S-ABA:

- You may be legally prohibited from readjusting S-ABAs in some jurisdictions.
- Your employer may prohibit you from adjusting the S-ABAs.
- You shouldn't re-adjust a S-ABA unless you have been trained on exactly how to do it. There are several S-ABA products and each has different procedures that must be followed to readjust them without damaging the S-ABA.
- Manually adjusting a S-ABA improperly can damage the brake adjuster. Manufacturer's instructions for the S-ABA on the vehicle must be precisely followed.
- The brake chamber will return to the excessive stroke condition until the cause of the problem is repaired. Excessive stroke can return very quickly, in just a few brake applications.
- If you readjust the brake chamber stroke, you will have to take responsibility for doing so. This means you must continue to monitor the brake chamber stroke and report the excessive stroke problem to your employer or service provider at the first opportunity.
- If you hire someone to correct an excessive brake chamber stroke problem that is installed with a self-adjusting brake, be sure they are qualified brake technicians and fix the underlying cause for the excessive brake chamber stroke.
- If a brake chamber that is installed with S-ABAs exhibits excessive stroke, some of the possible contributing causes could include worn clevis or clevis pin connections, worn s-cam bushings, cracked chamber bracket or cam tube welds, worn rollers, cracked drums, worn linings, worn drums, and/or loose mounting hardware. A trained brake mechanic should investigate and diagnose the problems.

As a commercial truck or bus professional, you know the brake systems on your vehicles must work well every time they are on the road and under all conditions. If they do not, you could be risking your life or the lives of others.

To be able to stop effectively in every braking situation, all components in the air brake system, including the foundation brakes, must be properly installed and maintained by qualified technicians. Air brake chamber (or actuator) pushrod stroke must be kept within the regulation limits (or re-adjustment limits if in reference to manual brake adjusters, which are permitted only on older vehicles) specified by U.S. and Canadian regulations. Vehicles manufactured in the mid-1990s or later\* must be equipped with self-adjusting brake adjusters (S-ABAs) to automatically account for normal brake system wear.

During day-to-day driving a driver cannot "feel" how well brakes will work during an extreme braking maneuver. The most effective check of air (drum) foundation brakes is to measure the pushrod stroke to confirm that it is within federal specifications. If pushrod stroke is beyond the regulation limit, the foundation brake may no longer be capable of providing full braking force, and the brake needs servicing.

Failure to properly service brake systems is the most common reason drivers (and motor carriers) are issued vehicle Out-of-Service (OOS) orders. When pushrod stroke exceeds the regulation limit, something is wrong with the brake and it is a violation. By following manufacturer recommended foundation brake maintenance intervals (for lubrication, lining replacement, wear tolerances, etc.), regularly measuring the pushrod stroke, and addressing issues as they arise, you lower your crash risk, help your company's safety rating, and greatly reduce your chances of a violation or OOS condition.

Whenever checking pushrod stroke, look for signs of other violations such as: damaged, broken, or missing components; air leaks; rusty or cracked drums; damaged linings; worn linings; and brakes that simply are not working.

\* see inside if your vehicle requires S-ABAs

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# Air Brake PUSHROD STROKE

## Why is it so important?

For further information regarding the Commercial  
Vehicle Safety Alliance and commercial motor vehicle  
safety & security

Commercial Vehicle Safety Alliance (CVSA)  
6303 Ivy Lane, Suite 310  
Greenbelt, MD 20770  
(301) 830-6143  
[www.cvsa.org](http://www.cvsa.org)  
[www.operationairbrake.com](http://www.operationairbrake.com)







# Pushrod Stroke Measurement Procedure

First, put the vehicle in a safe location and make sure the wheels are blocked (to prevent rolling). Release the spring brakes. Confirm your dash gauge indicates that you have 90 to 100 psi supply pressure in the air brake system reservoirs, and then shut off the engine (**IMPORTANT NOTE:** Supply reservoir pressure exceeding 110 psi will result in incorrect pushrod stroke assessments).

Second, visit each brake, confirm it is in the normal released position with nothing obviously wrong or out of place, and mark each pushrod to establish a reference starting location (e.g., level with where the pushrod exits the brake chamber or the chamber mounting bracket—you will need to note where the pushrod mark started out and where it ends up, and then measure the difference in the next step; see Figure 1).

Figures: Pushrod stroke is the length (in inches or centimeters) that the brake actuator pushrod travels between the released and brake pedal fully applied position.

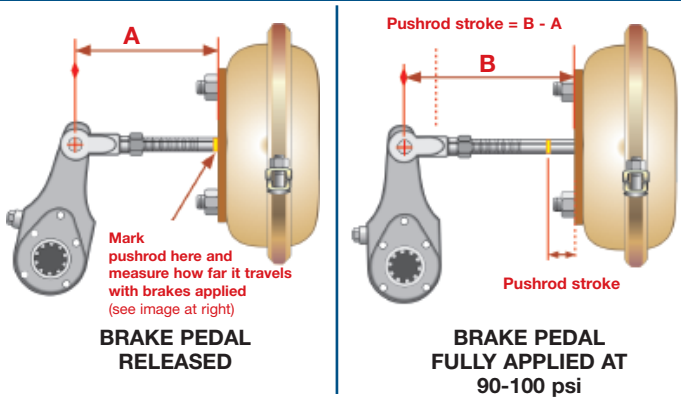


Figure 1 Marking the pushrod before brakes are applied assists with measuring stroke.

Third, fully press and hold the service brakes applied (pushing the brake pedal all the way down until it stops) while you measure and record the distance each pushrod mark has moved (or “stroked”). Note that it is normal for pressure to drop slightly as brakes are applied. If multiple brake applications cause the pressure to drop below 90 psi, it is okay to pause the procedure to rebuild reservoir pressure to 90 - 100 psi, and resume.

Finally, compare your recorded pushrod stroke values with the regulation stroke limits for your brake chambers (see Table I). If any chamber stroke measurements are near or at the regulation stroke limits for your particular chamber types and sizes, the complete foundation brake, brake chamber, S-ABA, drum, and wheel end need to be inspected in more detail and serviced at the next opportunity. If any chamber stroke measurements exceed the regulation stroke limits, you risk not only receiving a violation, being placed out of service, and impacting your safety ratings, but also operating a vehicle that may take longer to stop when you most need it!

# Regulation Stroke Limits For Clamp-Type Brake Chambers

(1) In safe location, block wheels and release spring brakes; (2) bring air pressure to 90-100 psi & turn off engine; (3) identify the size and type of brake chamber; (4) mark pushrods; (5) fully apply & hold brakes; (6) measure & confirm pushrod stroke is within regulation limits

SIZE	MARKING (available on some chambers)	OUTSIDE DIAMETER (reference)	REGULATION STROKE LIMIT
6	None	4 1/2" (115 mm)	1 1/4" (32 mm)
9	None	5 1/4" (133 mm)	1 3/8" (35 mm)
12	None	5 11/16" (144 mm)	1 3/8" (35 mm)
16	None	6 3/8" (162 mm)	1 3/4" (45 mm)
16LS	Tag & Marking	6 3/8" (162 mm)	2" (51 mm)
20	None	6 25/32" (172 mm)	1 3/4" (45 mm)
20LS	Tag & Marking	6 25/32" (172 mm)	2" (51 mm)
24	None	7 7/32" (183 mm)	1 3/4" (45 mm)
24L	'L' and Stroke Tag	7 7/32" (183 mm)	2" (51 mm)
24LS	Tag & Marking	7 7/32" (183 mm)	2 1/2" (64 mm)
30	None	8 3/32" (205 mm)	2" (51 mm)
30	'DD3' (Bus/Coach)	8 1/8" (206 mm)	2 1/4" (57 mm)
30LS	Square Ports, Tag & Marking	8 3/32" (205 mm)	2 1/2" (64 mm)
36	None	9" (228 mm)	2 1/4" (57 mm)

Table 1 — Regulation stroke limits are set by regulation based on chamber size and whether standard or long stroke (LS) design. You must know the size and type of brake chamber on each axle of your vehicle to fully check it for brake stroke compliance. **IMPORTANT NOTE:** Stroke values marked on chambers or tags are manufacturers' rated stroke values and not regulation stroke limits. Always use regulation stroke limits to determine compliance.

## How Can Brake Chamber Stroke Indicators Help You?

Brake chamber stroke indicators can be installed to help you identify when stroke reaches or exceeds the functional limits. Checking stroke typically means you have to get under the vehicle and take measurements before and during a brake application. Stroke indicators can provide a visual aid to make stroke assessment easier, possibly without the need for crawling under the vehicle. It is recommended, however, that the procedure above be completed on a regular schedule. Visit [www.operationairbrake.com](http://www.operationairbrake.com) for more information about chamber stroke indicators.

## Consider Keeping a Chamber Stroke Measurement Record

Many fleets and owner operators have found success in preventing violations by tracking brake chamber stroke measurements at each wheel end as part of their periodic maintenance programs. This involves recording pushrod stroke each time you measure it (per the above procedure).

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For example, consider a truck-tractor with Type 24LS (Long Stroke) chambers on the steer axle, and Type 30LS on the drive axles. Regulation stroke limits for Type 24LS and Type 30LS are 2 inches and 2.5 inches, respectively. The table below shows pushrod stroke measurements recorded on three occasions. Note the circled entries show one brake at the regulation limit (it will need service soon) and another exceeding the regulation limit (it is a violation and should be serviced). This table can be expanded to account for all axles in a vehicle or combination.

	Chamber Size:	Type 24LS	Type 24LS	Type 30LS	Type 30LS	Type 30LS	Type 30LS
	Regulation Stroke Limit	2"	2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"
Date	Odometer	L Steer	R Steer	LF Drive	RF Drive	LR Drive	RR Drive
7/6	235,643 mi	1 1/2	1 1/2	1 1/4	1 3/4	1 1/2	1
7/26	243,355 mi	1 1/2	1 3/4	1 1/4	1 3/4	2 1/4	1 1/4
8/18	250,221 mi	1 1/2	2	1 1/2	1 3/4	2 3/4	1 1/4

Table 2

## What To Do When Your Brake Chamber Stroke Violates the Regulations

When brake chamber pushrod stroke exceeds the regulation stroke limit, what you do about it depends on whether your vehicle is equipped with manual brake adjusters or S-ABAs.

## Re-adjusting manual brake adjusters

Manual brake adjusters, permitted on older vehicles, must be re-adjusted on a regular basis. This should be done only by qualified individuals. If regulations require your vehicle to be equipped with S-ABAs, based on its date of manufacture, installing and using a manual brake adjuster in place of the S-ABA is a violation.

## Self-adjusting brake adjusters

Self-adjusting brake adjusters (S-ABAs) should not be manually adjusted—they will do so automatically. If a chamber with an S-ABA is found with excessive stroke, there is a problem with either the foundation brake, drum, S-ABA itself, or other components, and the entire wheel end (chamber, S-ABA, drum, hub and other hardware) should be inspected and serviced by an authorized brake technician as soon as possible. A manual re-adjustment may temporarily improve the stroke length, but it can damage the S-ABA and it does not fix the underlying problem. The stroke violation may return even within a few brake applications and, most importantly, stopping ability may be significantly impaired.