Meritor
Foundation Brake Training

Jason Baumann – Trainer

Vaughn Holdsworth – Specialty Service Manager

Matt Long – Specialty Field Service

Agenda

- **Meritor Foundation Brake (Cam Brake) (8:30-11:00)**
- Component Identification
- Basic Operation
- Diagnosis and Setup
- **Meritor Air Disc Brake Overview (11:00-12:00)**
- Component Identification
- Basic Operation
- Diagnostics and Setup
- **Lunch (12:00-1:00)**
- **Hands On / Lab Instruction (1:00-2:30)**
- **Meritor Support /Q&A (2:30-3PM)**
- OnTrac Technical Support / Warranty
- Bullpen Online Training

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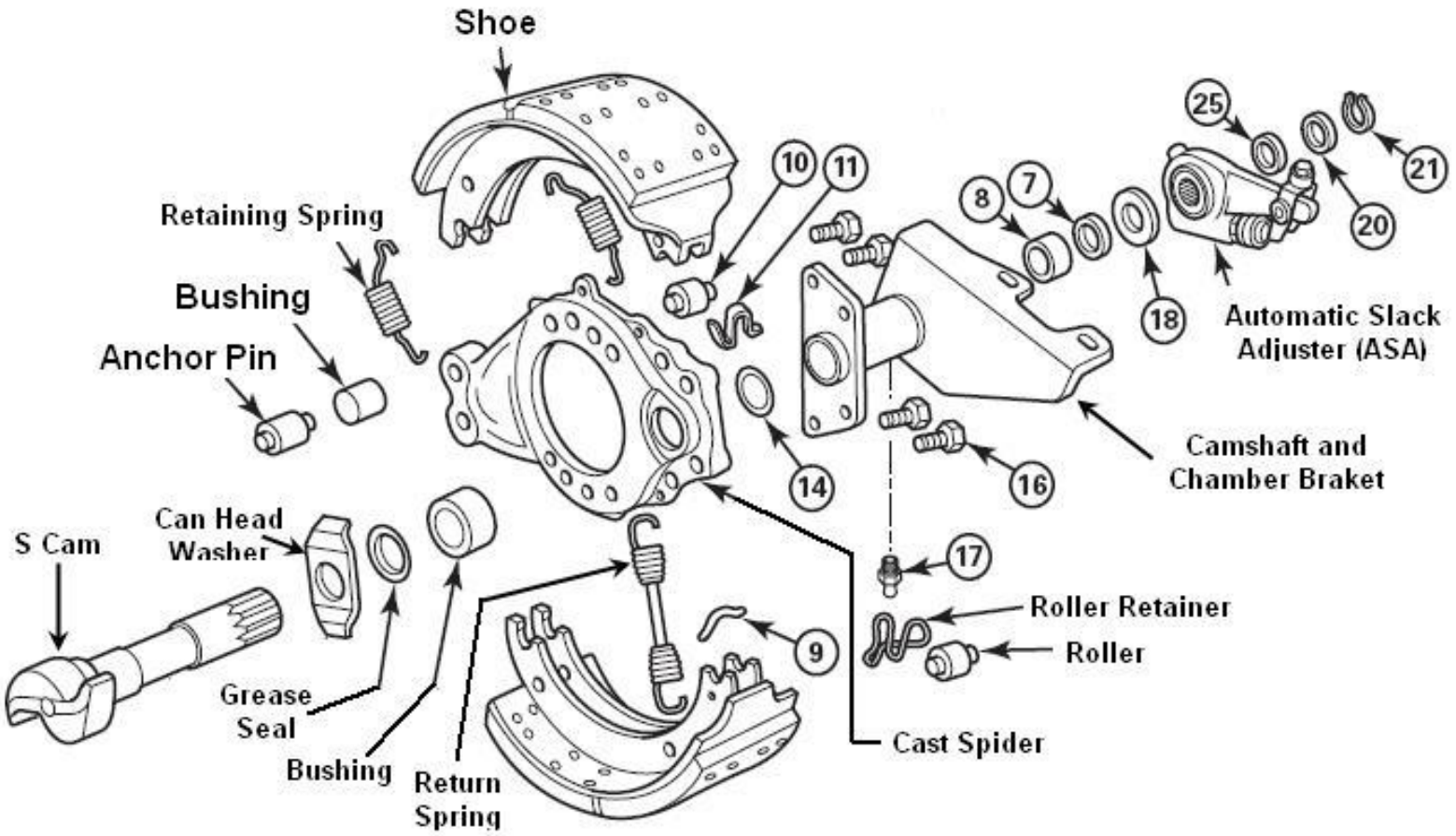
Meritor Foundation Brake Training

Key Components



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Cam Operated Foundation Brakes

- Most important feature of a cam brake is its simplicity
  - Easy to maintain
  - Provides good durability through simple design and minimal parts
- Limitations include:
  - Limited stroke
  - Contact forces

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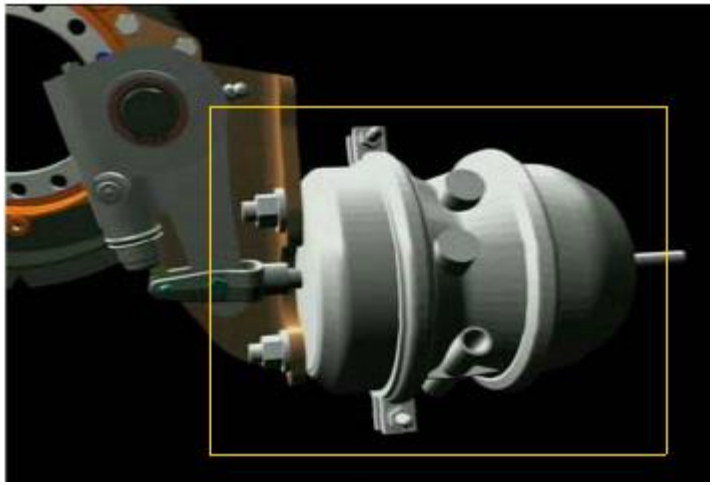
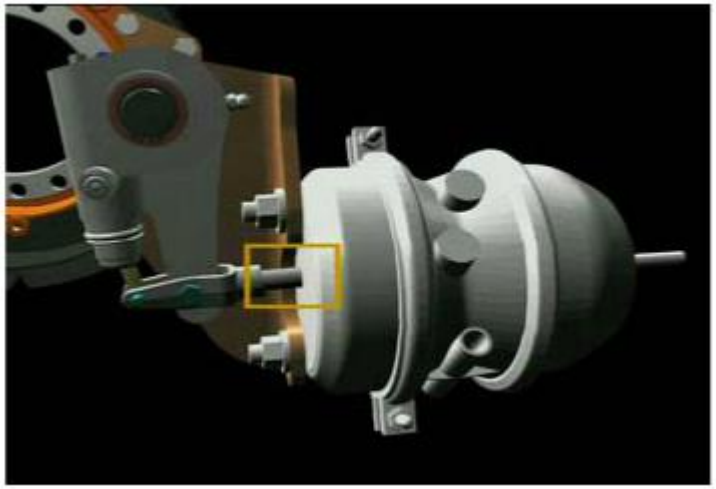
The air chamber connects the air system to the cam brakes





A pushrod in the air chamber actuates the brake

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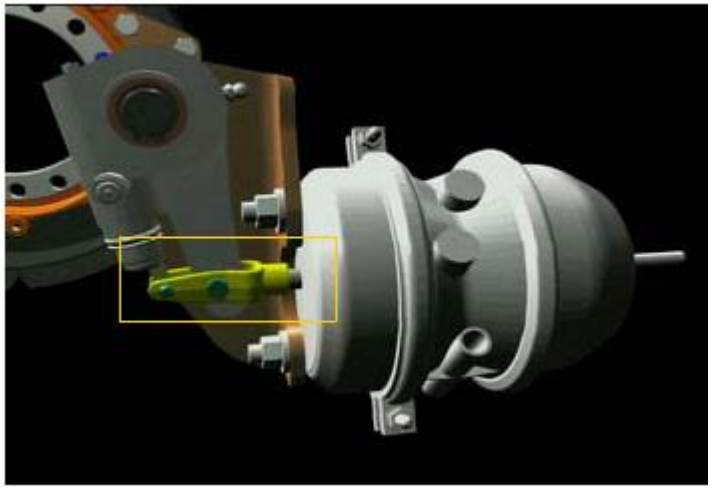
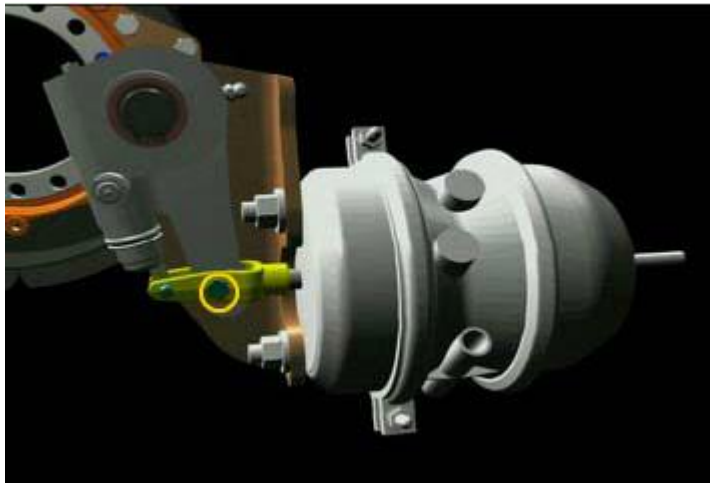
A clevis is either threaded or welded onto the pushrod





A clevis pin connects the push rod to the automatic slack adjuster – which enables the slack adjuster to pivot

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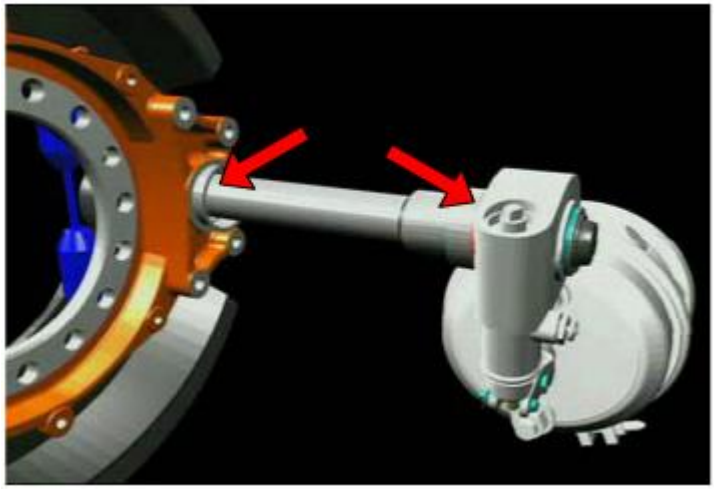
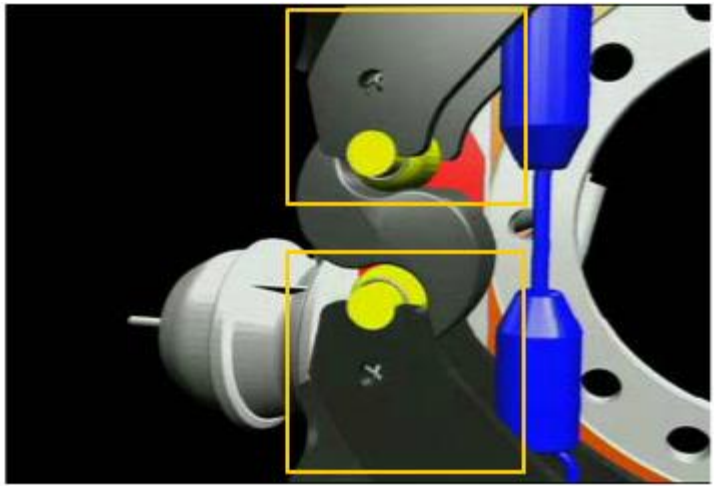
The slack adjuster is splined to the camshaft which is mounted in a bracket and supported by two bushings





One end of each brake shoe is supported on the camshaft head through the two rollers

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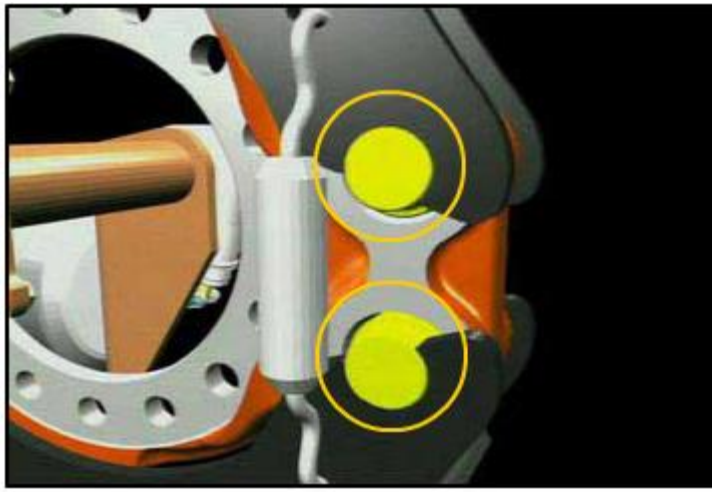
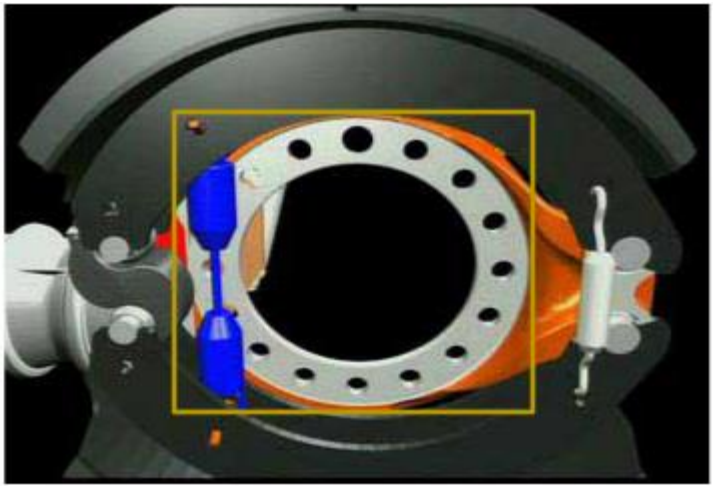
The brake shoes are mounted to the brake spider by anchor pins which enable the shoes to pivot on the anchor pins during operation





The brake spider is either bolted to or welded to the axle end

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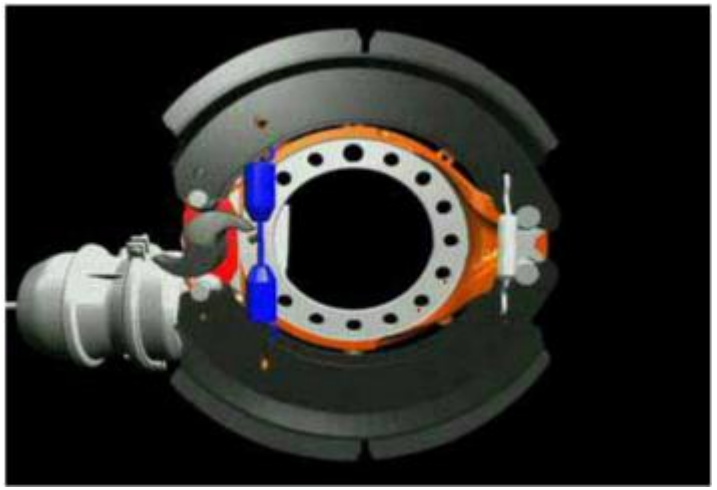
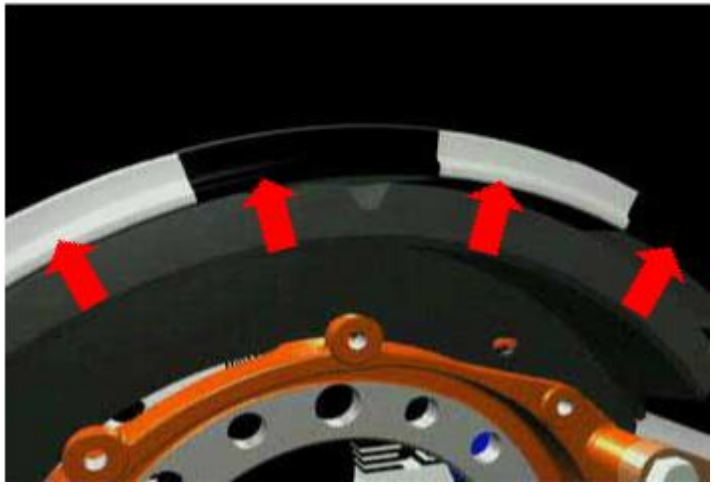
The S shaped cam rotates as brakes are applied and force the brake shoes into the drum





When the brake shoes are forced into the drum, friction is created that slows the movement of the drum, which stops the vehicle

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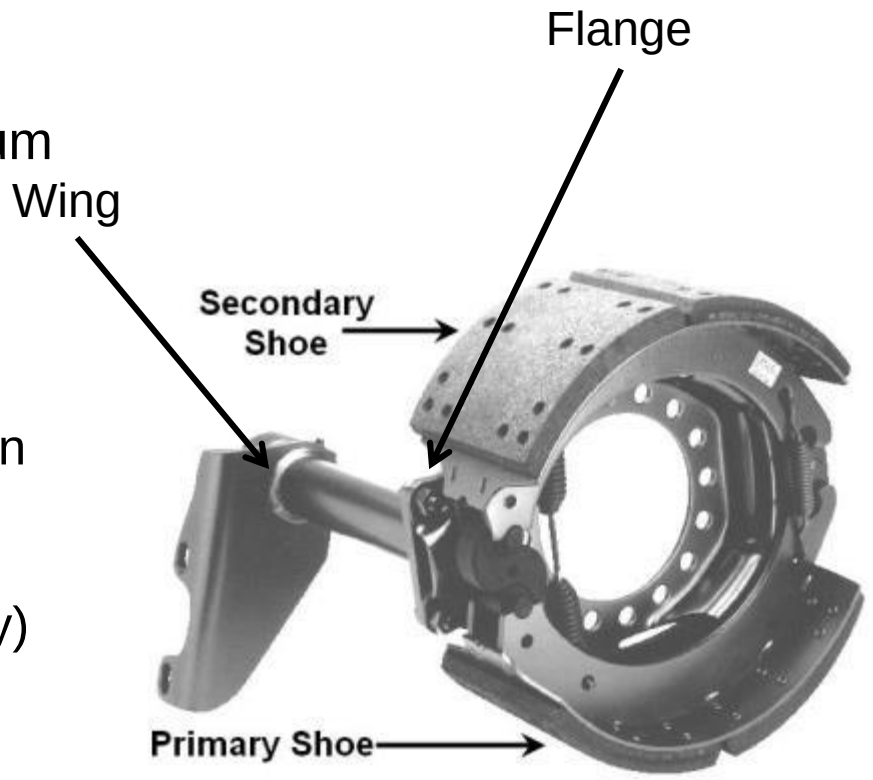
Cam Brake Shoes

- Structure that holds and applies the linings to the drum
- Primary Shoe
  - AKA Leading shoe
  - First shoe after the cam in the direction of the wheel rotation
  - Provides greater (primary) output
- Secondary Shoe
  - AKA Trailing shoe
  - After the cam in the direction opposite of wheel rotation



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Cam Brake Identification

- Different ways to identify a Meritor Brake
  - Lining information
  - Brake Shoe Tag
  - Camshaft tube tag
  - Slack Adjuster Tag
- If all else fails, check the axle model #
  - Many Meritor model numbers will tell you what type of brake was used during production.

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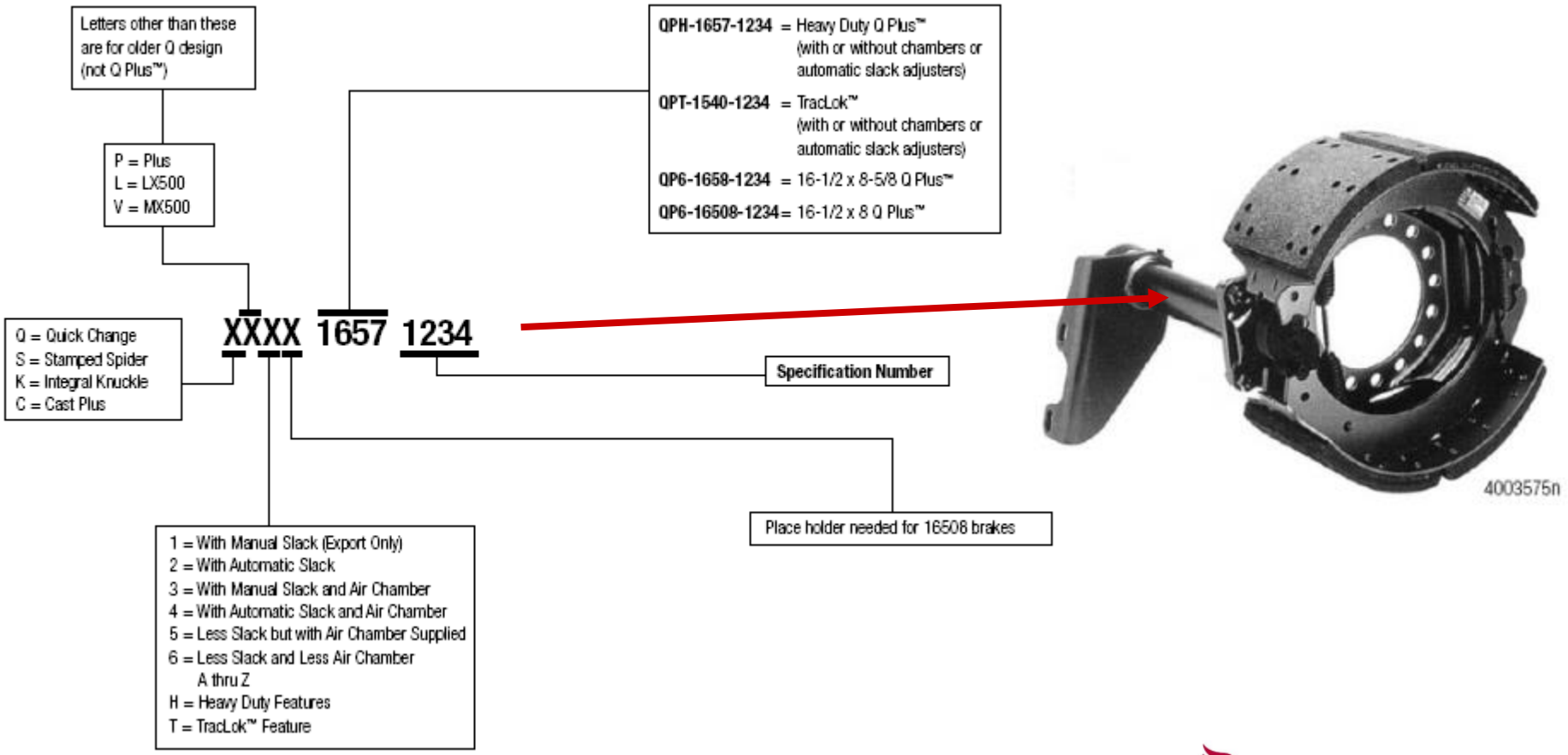
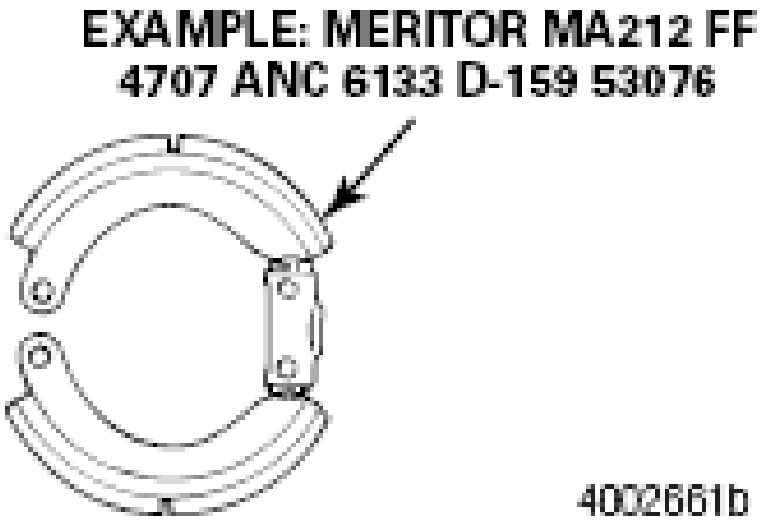
Cam Brake Identification

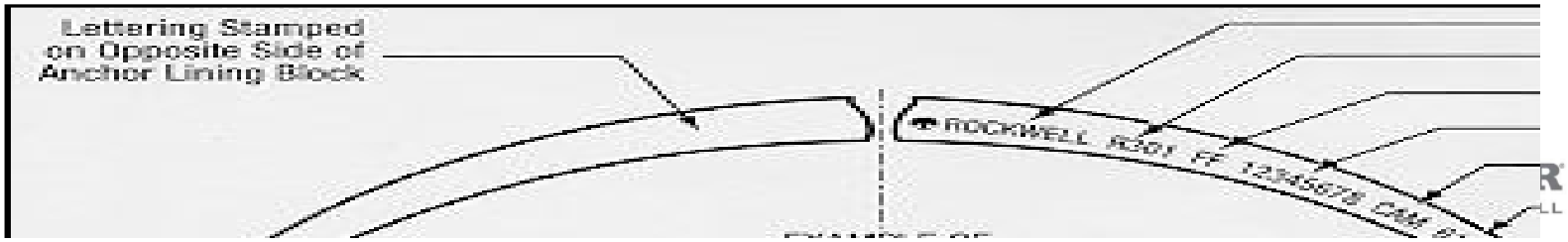
- Assembly Tag



Cam Brake Lining Identification

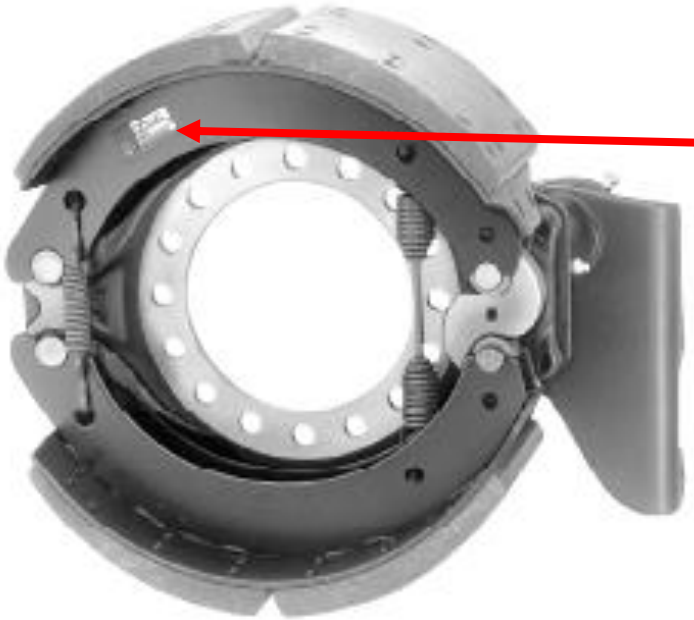
- The information that exists on the edge code of the lining is listed in the following order.
  - Meritor stamped logo
  - Lining mix designation
  - Friction code
  - Friction Material Standards Institute (FMSI) number, four to eight spaces
  - Block type
  - Meritor part number, last four digits
  - Word drawing engineering change letter
  - Julian date, four or five characters

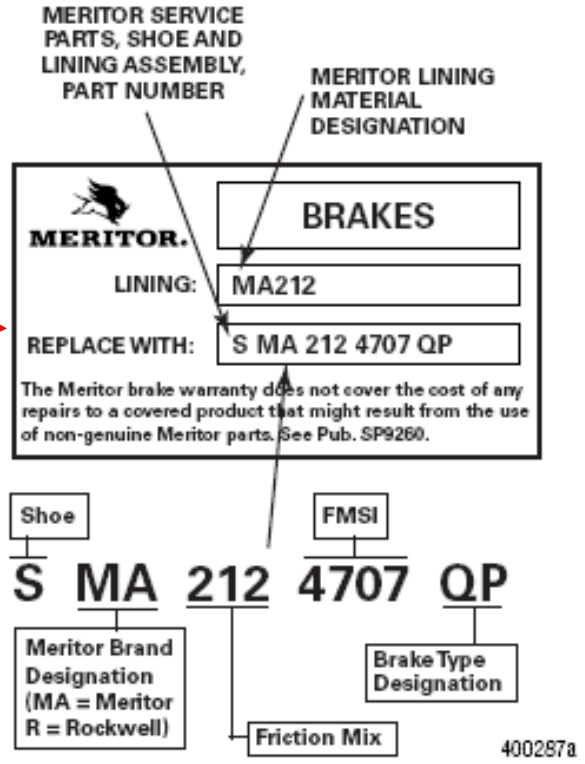




Cam Brakes Identification

- Tag on Shoe





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Friction Material Designations

- MAXXX – “Meritor Approved”
- SORXXX – “Spec Only Release”
- RXXX – “Rockwell Released”

- MA2XX – 20,000 lbs Rated Material
- MA3XX – 23,000 lbs Rated Material
- MA4XX – High Friction Material
- MA5XX – Wedge Brake Material
- MA6XX – Specialty Material
- MA7XX – Disc Brake Material

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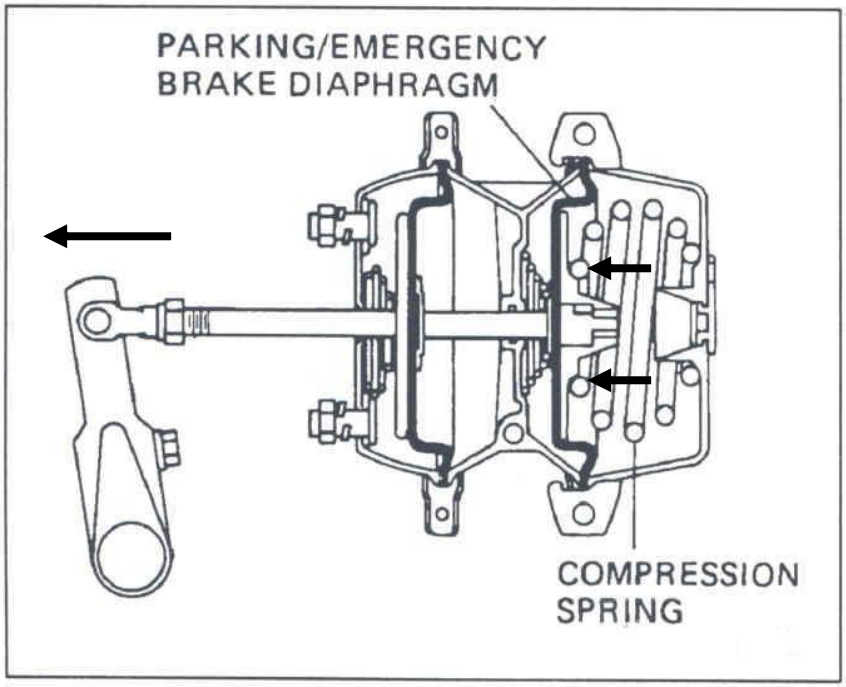
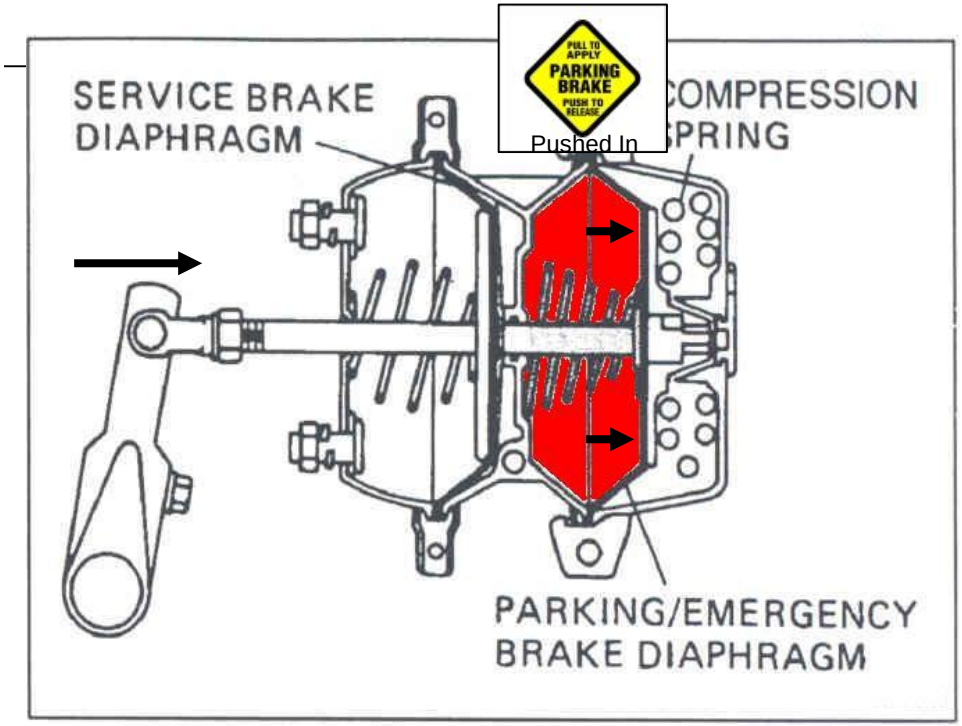
Brake Chamber Operation Review



Parking/emergency brakes applied



Parking/emergency brakes released

Spring brake applied

No air applied to the chamber. Parking or Spring brake is applied. Vehicle parked.

Spring Brake released

Air applied to the parking or spring brake side of the chamber. The spring is compressed to release the brakes.

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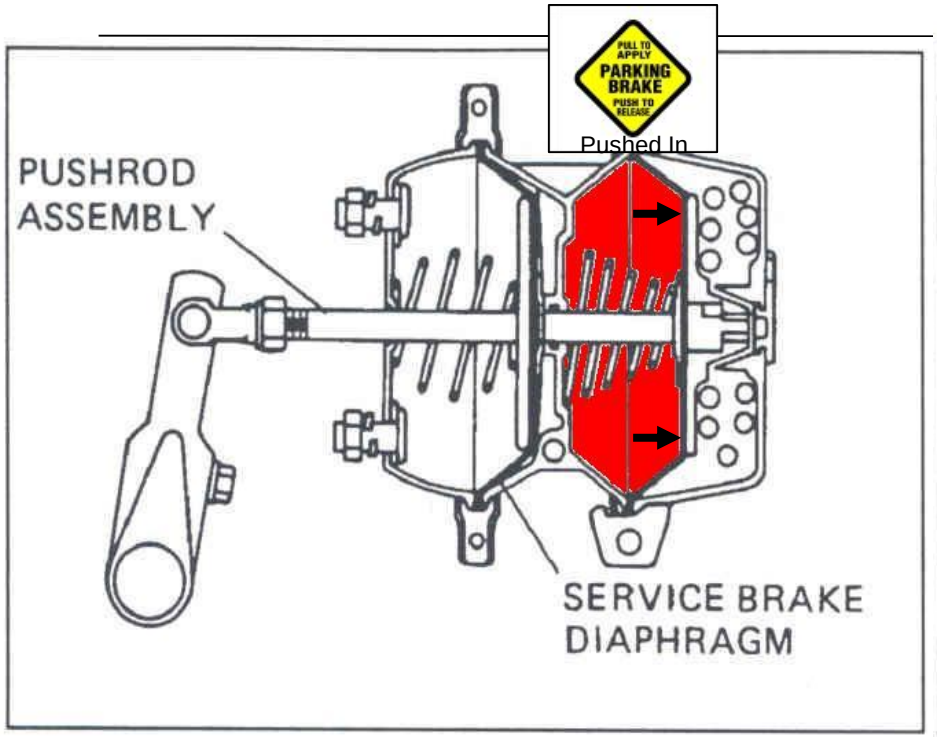
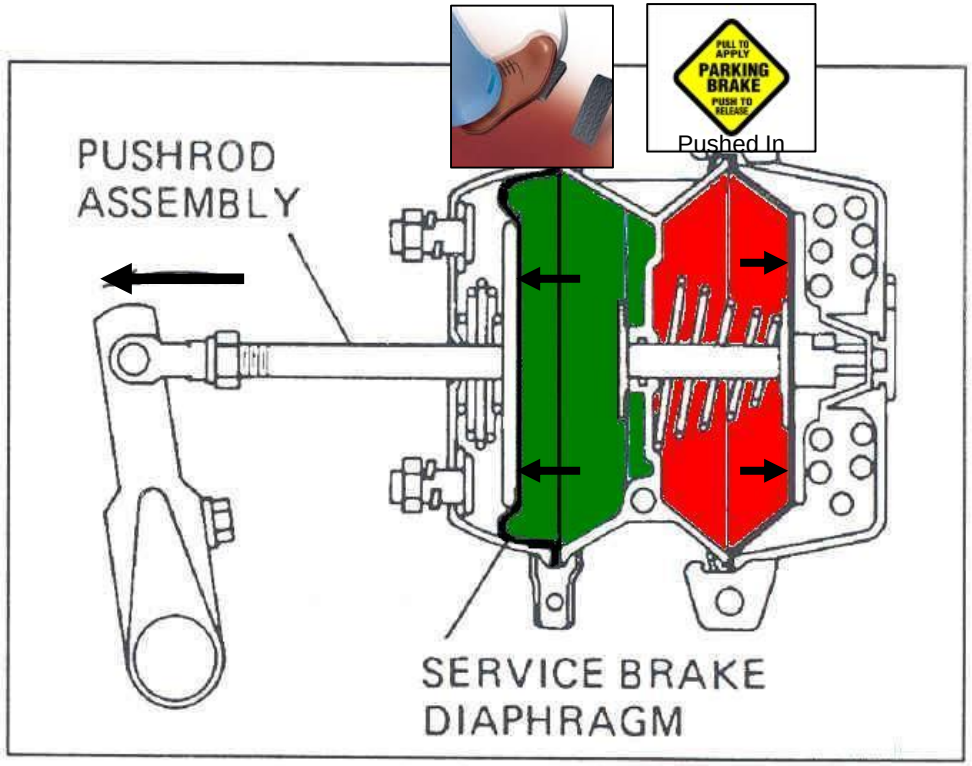
Brake Chamber Operation Review



Service brakes released



Service brake applied

Spring brake released .
Air applied to the parking or spring brake side of the chamber. (driving)

Service brake application.
Air is applied to the service side of the chamber. (air applied to spring brake)

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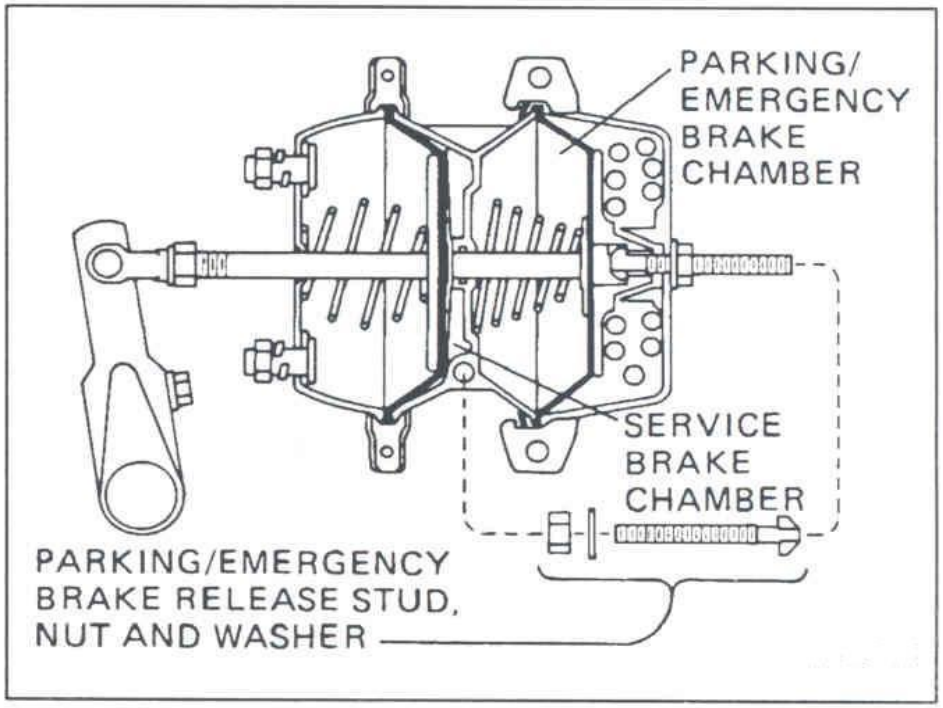
Brake Chamber Operation Review



Parking/emergency brakes manually released

Release or caging tool in use

The caging or release tool is used during brake repair to release the spring brake. Caging or releasing the spring allows the brake to be serviced, or to move a vehicle in a no air emergency. The tool is stored in the chamber body.

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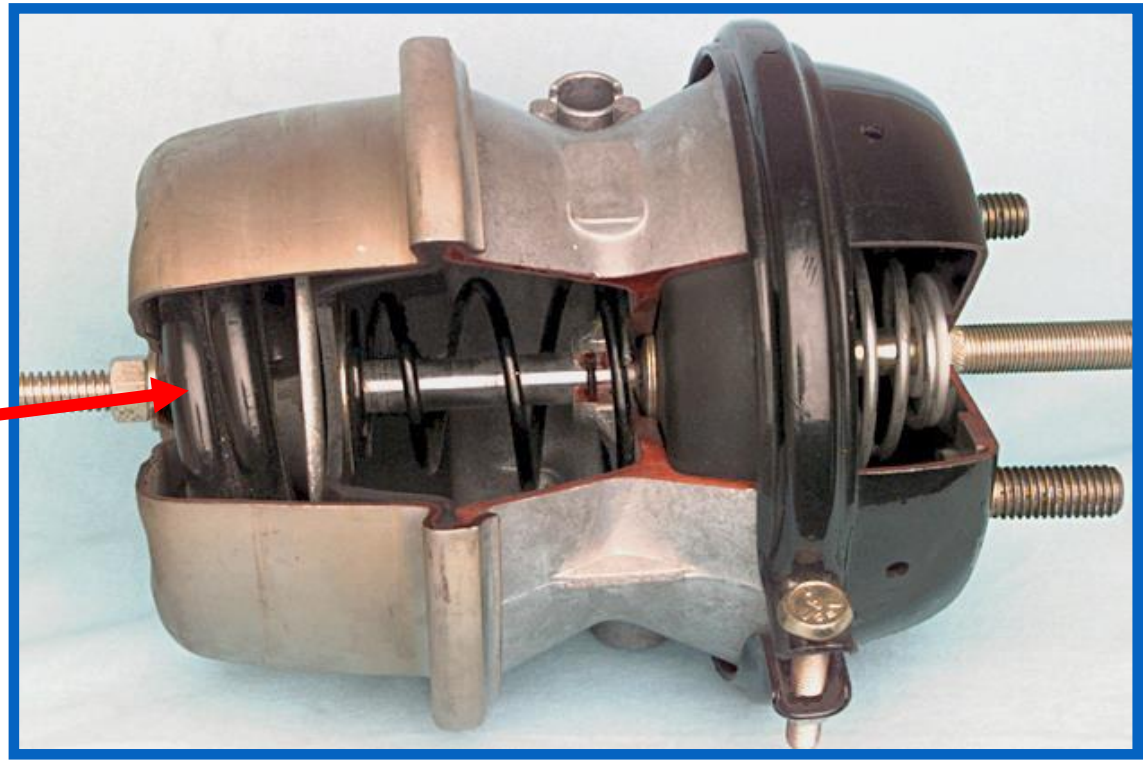
Spring brake Caution

Spring



DANGER : Powerful expansion spring could cause severe personal injury and/or property damage.

DISPOSAL?

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Brake Chamber Disarming Tool

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Long Stroke Air Brake Chambers

Spring brake chamber identification

Long Stroke

Permanent Identification the brake Chamber

Square Port Boss

Standard Stroke

Round Port Boss

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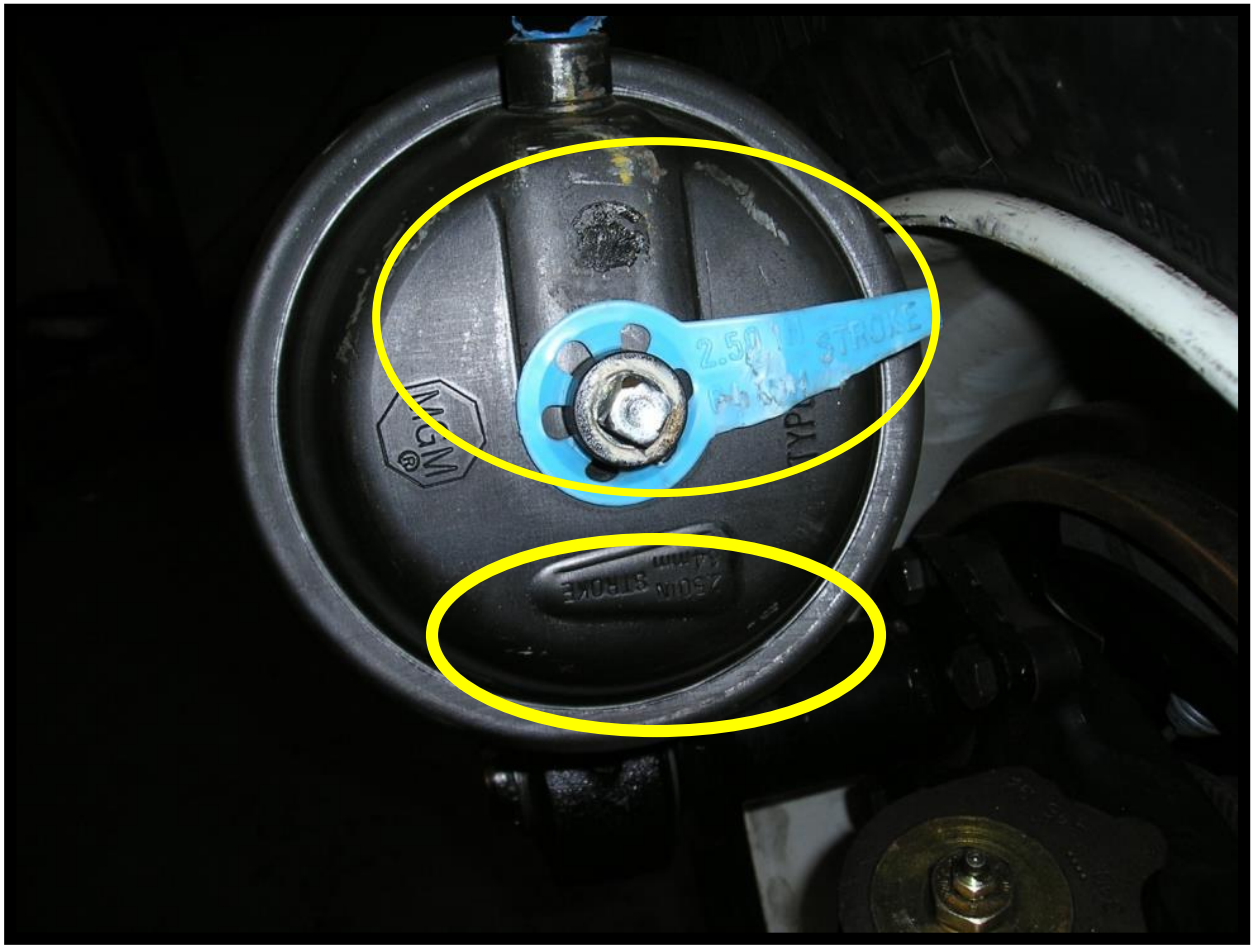
Long Stroke Air Brake Chambers

Service brake chamber identification



- Determines adjustment on power stroke (brake application)
- Adjusts on brake return stroke
- Uses internal adjusting pistons to provide consistent adjustment throughout lining life

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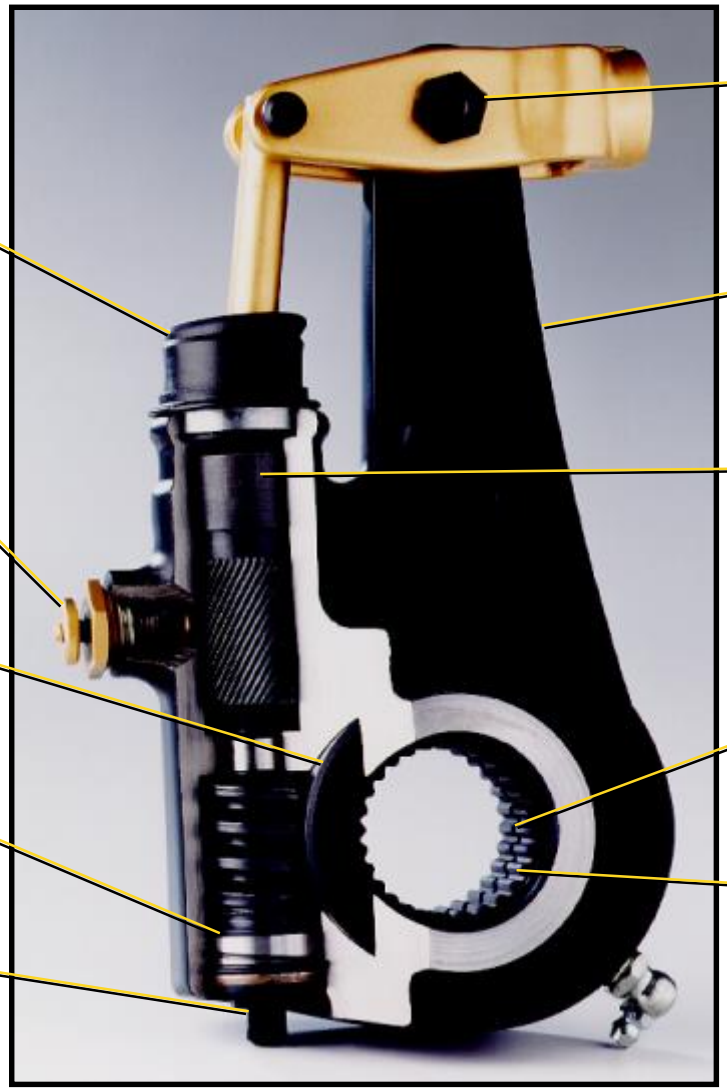
Meritor Automatic Slack Adjuster



Puncture Resistant Boot

Pull Pawl

Buttress-Type Worm Gear

Improved Worm Seal

Manual Adjusting Nut

Improved Clevis Pin Bushing

Redesigned Housing - Lightest Weight ASA

Variety of Pistons

Lubrication Holes and Groove

Improved Gear Face Seals

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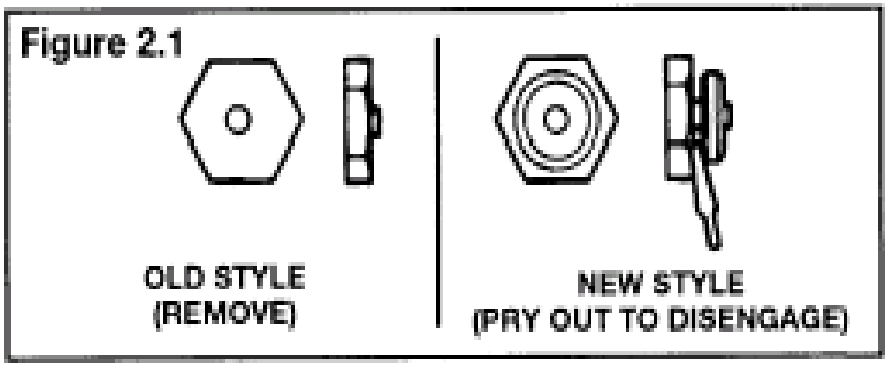
Pull Pawls

- Pull pawls are spring loaded.

- Pry the pull pawl out at least 1/32” to disengage the teeth.

- The earlier style (pre ‘93) automatic slack adjuster can be retrofitted with this new type



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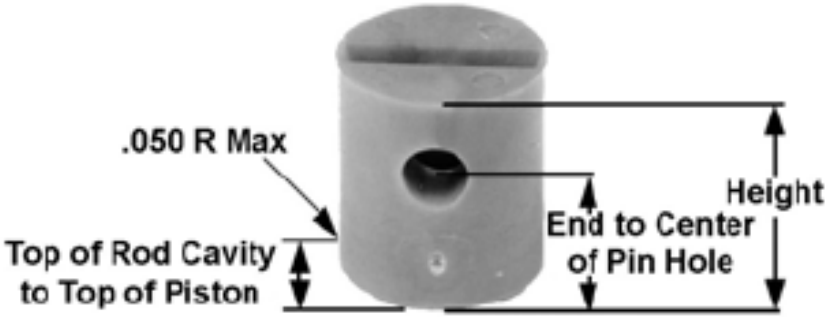
Piston height determines adjustment

PISTON ACTUATORS



PART NUMBER	HEIGHT	END TO CENTER OF PIN HOLE	TOP OF ROD CAVITY TO TOP OF PISTON	COLOR
2230-C-159	41/64"	7/16"	7/32"	Blue
2297-H-2842	43/64"	15/32"	1/4"	Green
2230-N-1054	11/16"	15/32"	1/4"	Yellow
2297-W-3637	45/64"	15/32"	1/4"	Red
2297-B-4188	47/64"	15/32"	1/4"	Black

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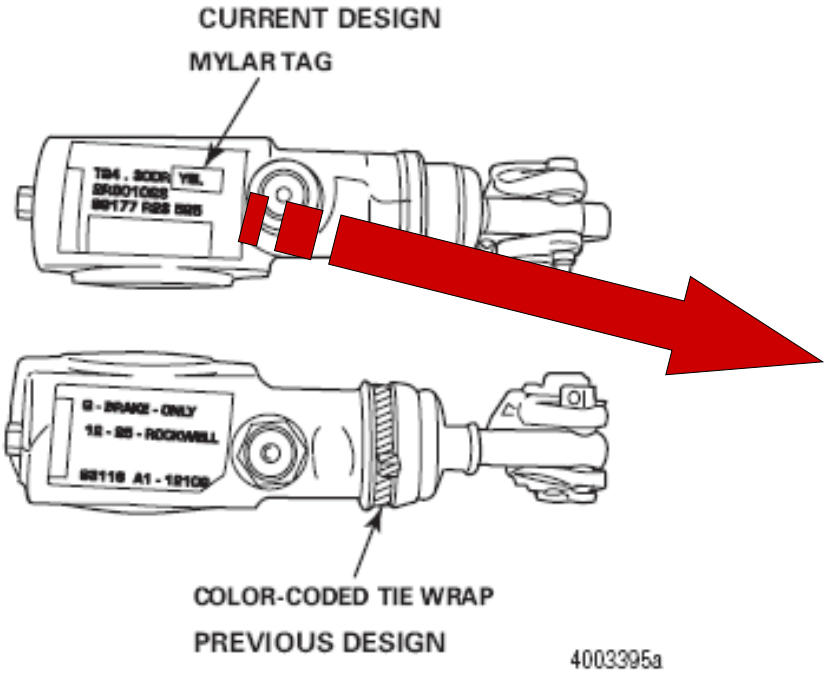
Piston color identification



Current Design

24 = Chamber Size

30 = Chamber Size

A28 1152S = Assembly Number

DR = Drum

03212 = Julian Date (212th day of 2003)

YEL = Piston Color (Yellow)

2R801073 = Aftermarket Part Number

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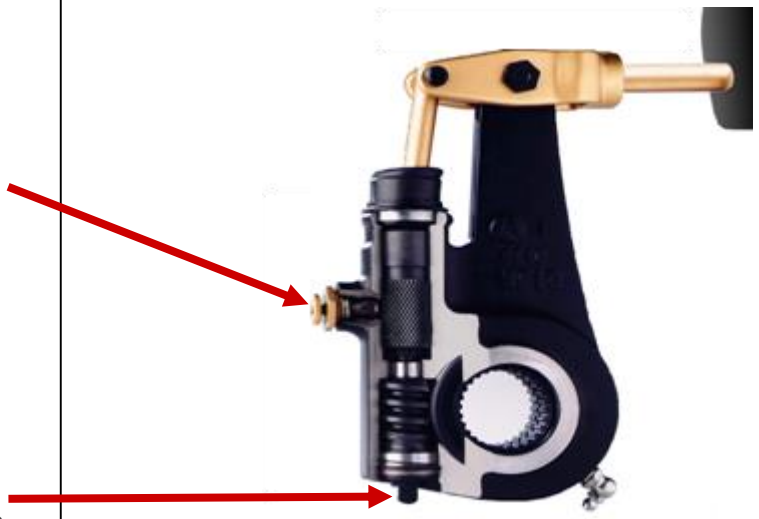
- **De-adjustment**
  - Pull pawls are spring loaded.
  - Pry the pull pawl out at least 1/32” to disengage the teeth when de-adjusting the brake.

- **Adjustment**
  - Turn manual adjusting nut counter-clockwise until the linings touches the drum
  - Turn the adjusting nut 1/2 turn for drum brakes
  - Check free stroke



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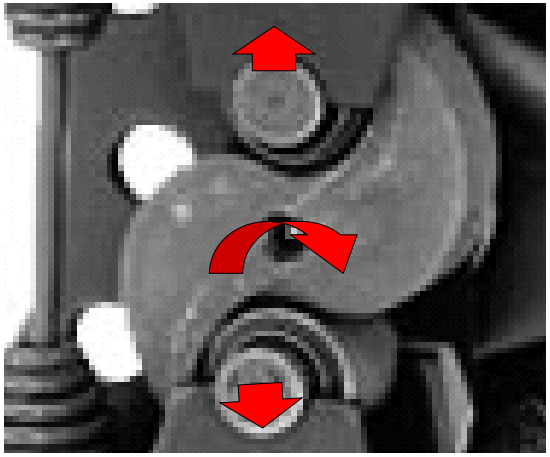
Camshaft

- Rotated by ASA, separates the rollers
- Camshafts are directional
  - Observe camshaft profile to determine whether left or right handed
- Desired application is to have camshaft rotate in the same direction as the wheel end

Cam Rotation



Right hand camshaft

Left hand camshaft

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Use the schedule that requires the most frequent inspection and lubrication from the list below

- Vehicle manufacturer's schedule
- Fleet's schedule
- Every six months
- A minimum of four times during the life of the linings

Refer to MM4 for Meritor Grease recommendations

*Note: Release the parking brake before greasing brake components.

Lubrication

Cam Brakes

Refer to Table H for grease specifications.

Table H: Cam Brake Grease Specifications

Components	Meritor Specification	NLGI Grade	Grease Type	Outside Temperature
Retainer Clips Anchor Pins Rollers (Journals Only) Camshaft Bushings Camshaft Splines Automatic Slack Adjusters*	0-704	2	Calcium Sulfonate Complex	Down to –30°F (–34.4°C)

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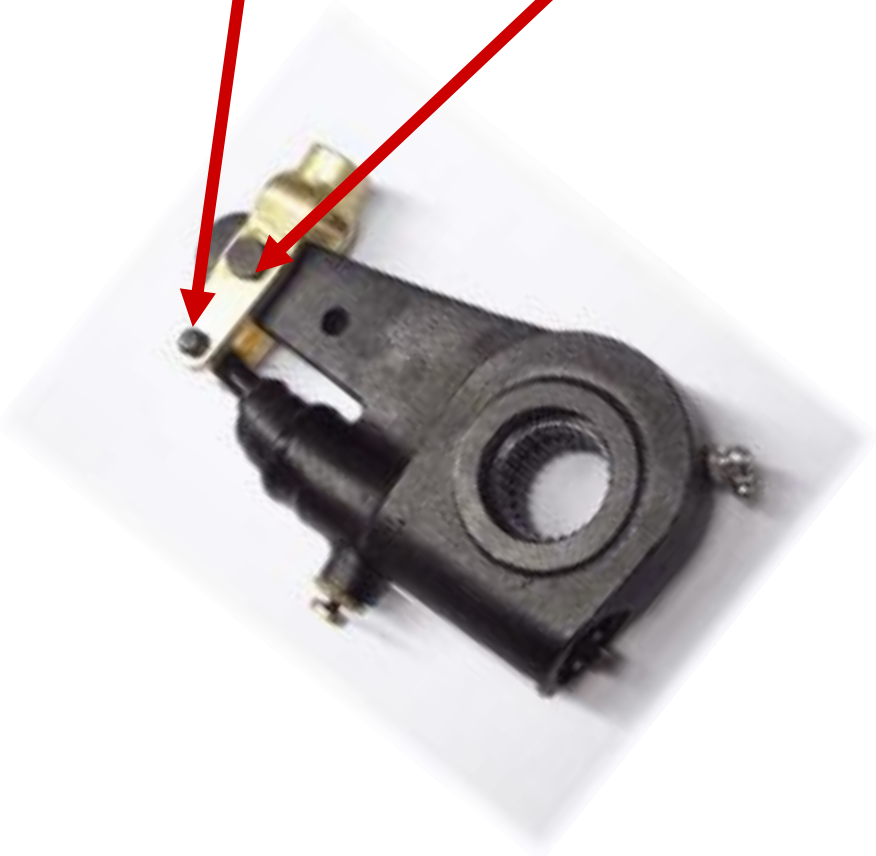
Inspect the clevis pins for rotation and lubricate with Anti-Seize



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Free Stroke and Applied Stroke

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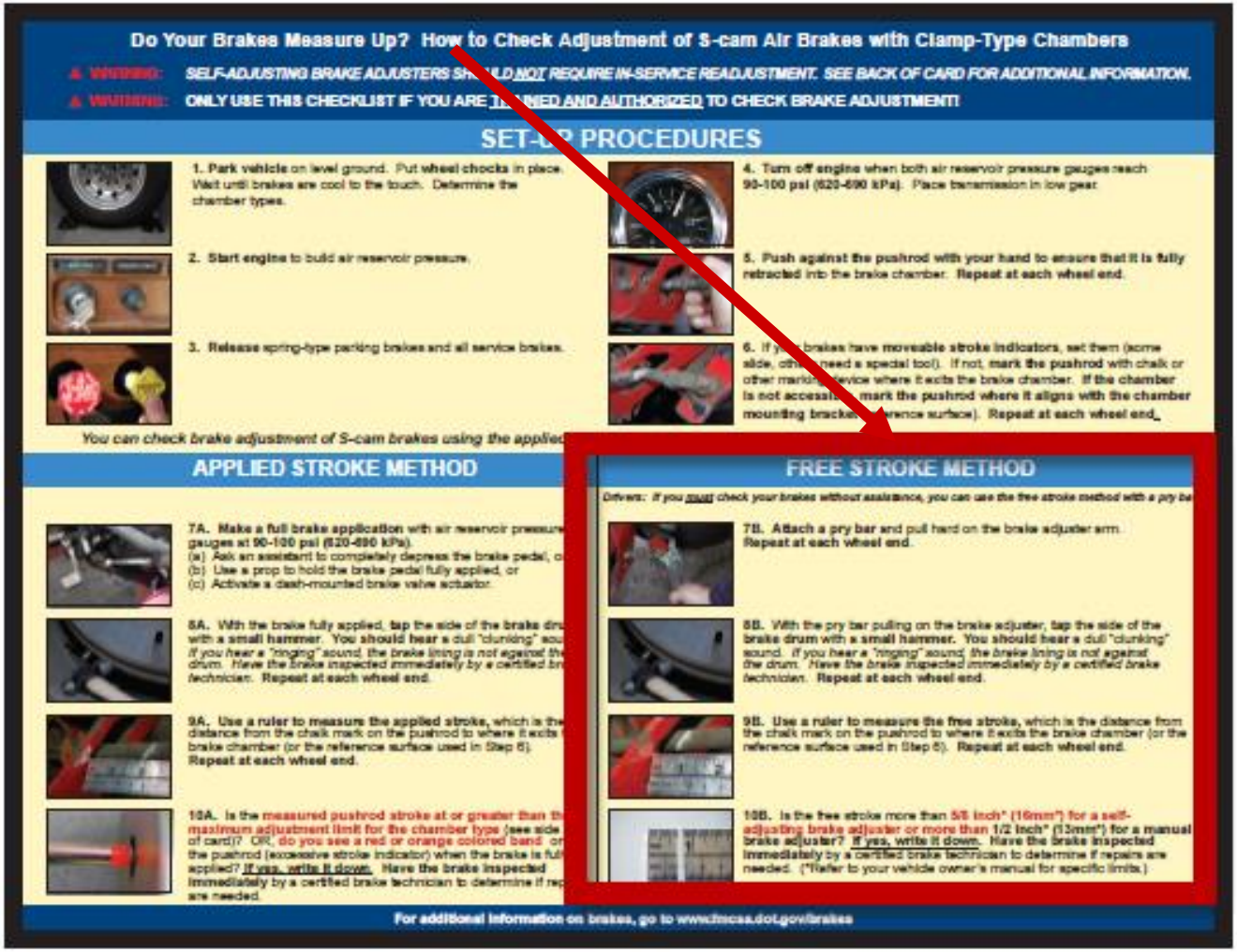
Meritor TP-0879 Provides Free Stroke Information



Do Your Brakes Measure Up? How to Check Adjustment of S-cam Air Brakes with Clamp-Type Chambers

▲ WARNING: SELF-ADJUSTING BRAKE ADJUSTERS SHOULD NOT REQUIRE IN-SERVICE READJUSTMENT. SEE BACK OF CARD FOR ADDITIONAL INFORMATION.

▲ WARNING: ONLY USE THIS CHECKLIST IF YOU ARE TRAINED AND AUTHORIZED TO CHECK BRAKE ADJUSTMENT!

SET-UP PROCEDURES

1. Park vehicle on level ground. Put wheel chocks in place. Wait until brakes are cool to the touch. Determine the chamber types.

2. Start engine to build air reservoir pressure.

3. Release spring-type parking brakes and all service brakes.

4. Turn off engine when both air reservoir pressure gauges reach 90-100 psi (620-690 kPa). Place transmission in low gear.

5. Push against the pushrod with your hand to ensure that it is fully retracted into the brake chamber. Repeat at each wheel end.

6. If your brakes have moveable stroke indicators, set them (some slide, others need a special tool). If not, mark the pushrod with chalk or other marking device where it exits the brake chamber. If the chamber is not accessible, mark the pushrod where it aligns with the chamber mounting bracket (reference surface). Repeat at each wheel end.

You can check brake adjustment of S-cam brakes using the applied

APPLIED STROKE METHOD

7A. Make a full brake application with air reservoir pressure gauges at 90-100 psi (620-690 kPa).
(a) Ask an assistant to completely depress the brake pedal, or
(b) Use a prop to hold the brake pedal fully applied, or
(c) Activate a dash-mounted brake valve actuator.

8A. With the brake fully applied, tap the side of the brake drum with a small hammer. You should hear a dull "clunking" sound. If you hear a "ringing" sound, the brake lining is not against the drum. Have the brake inspected immediately by a certified brake technician. Repeat at each wheel end.

9A. Use a ruler to measure the applied stroke, which is the distance from the chalk mark on the pushrod to where it exits the brake chamber (or the reference surface used in Step 6). Repeat at each wheel end.

10A. Is the measured pushrod stroke at or greater than the maximum adjustment limit for the chamber type (see side of card)? OR, do you see a red or orange colored band on the pushrod (excessive stroke indicator) when the brake is fully applied? If yes, write it down. Have the brake inspected immediately by a certified brake technician to determine if repairs are needed.

FREE STROKE METHOD

Drivers: If you must check your brakes without assistance, you can use the free stroke method with a pry bar.

7B. Attach a pry bar and pull hard on the brake adjuster arm. Repeat at each wheel end.

8B. With the pry bar pulling on the brake adjuster, tap the side of the brake drum with a small hammer. You should hear a dull "clunking" sound. If you hear a "ringing" sound, the brake lining is not against the drum. Have the brake inspected immediately by a certified brake technician. Repeat at each wheel end.

9B. Use a ruler to measure the free stroke, which is the distance from the chalk mark on the pushrod to where it exits the brake chamber (or the reference surface used in Step 6). Repeat at each wheel end.

10B. Is the free stroke more than 5/8 inch* (16mm*) for a self-adjusting brake adjuster or more than 1/2 inch* (13mm*) for a manual brake adjuster? If yes, write it down. Have the brake inspected immediately by a certified brake technician to determine if repairs are needed. (*Refer to your vehicle owner's manual for specific limits.)

For additional information on brakes, go to www.fmcsa.dot.gov/brakes

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Meritor TP-0879 Provides Applied Stroke Limits

MAXIMUM ADJUSTMENT LIMITS FOR S-CAM AIR BRAKES WITH CLAMP-TYPE CHAMBERS

Using the applied stroke method, 90-100 psi (620-690 kPa) reservoir pressure

CHAMBER TYPE (Size)

You can determine the type (or size) of brake chamber 3 ways:
1. Use a special tool,
2. Look for the word "TYPE" followed by a number (e.g., 9, 12, 16, 20, 24, 30, 36) on the clamp or body of the brake chamber, or
3. Ask a certified brake technician.

NOTE: Although clamp-type is the most common brake chamber, there are others. Check with a certified brake technician if you are uncertain about the style, type and maximum applied stroke of brake chambers installed on your vehicle.

Special Tool

Numeric Markings

STANDARD Stroke Brake Chambers

Standard stroke brake chambers generally have:
- ROUND ports,
- NO SPECIAL TAG or service instructions embossed on flange cage.

TYPE	Brake Adjustment Limit @ 90-100 psi
9	1-3/8 inches (35 mm)
12	1-3/8 inches (35 mm)
16	1-3/4 inches (45 mm)
20	1-3/4 inches (45 mm)
24	1-3/4 inches (45 mm)
30	2.0 inches (51 mm)
36	2-1/4 inches (57 mm)

LONG Stroke Brake Chambers

Look for one of the following three features. They generally distinguish a long stroke brake chamber from a standard stroke brake chamber (SAE J1817):

1. Raised SQUARE port on spring brake chamber (NOTE: used on Type 24" and Type 30L chambers ONLY) or Raised SQUARE embossment (service brake chamber)
2. TRAPEZOID-shaped tag
3. INSTRUCTIONS EMBOSSED on flange case (Example: "Use only 3 inch long stroke diaphragm")

TYPE	Brake Adjustment Limit @ 90-100 psi
12L	1-3/4 inches (45 mm)
16L	2.0 inches (51 mm)
20L	2.0 inches (51 mm)
24L	2.0 inches (51 mm)
24" For 3" maximum stroke Type 24 chambers	2-1/2 inches (64 mm)
30L	2-1/2 inches (64 mm)

WARNING: Self-adjusting brake adjusters should only need manual readjustments when they are first installed and when brakes are relined. Only perform a "temporary" roadside manual re-adjustment to safely drive the vehicle directly to a certified shop for troubleshooting and repair.

REMEMBER: Brake adjustment problems could be caused by the adjuster; the chamber; the foundation brake; or other parts of the brake system.

REMEMBER: Manually re-adjusting a self-adjusting brake adjuster does not fix the problem; will not keep the brake in adjustment; can contribute to abnormal wear of the internal adjusting mechanism; and could cause the brake to fail.

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

ArvinMeritor

(TP-0879) August 2007

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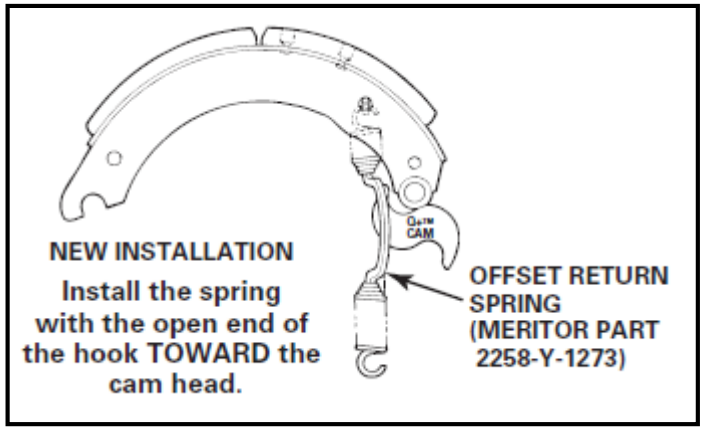
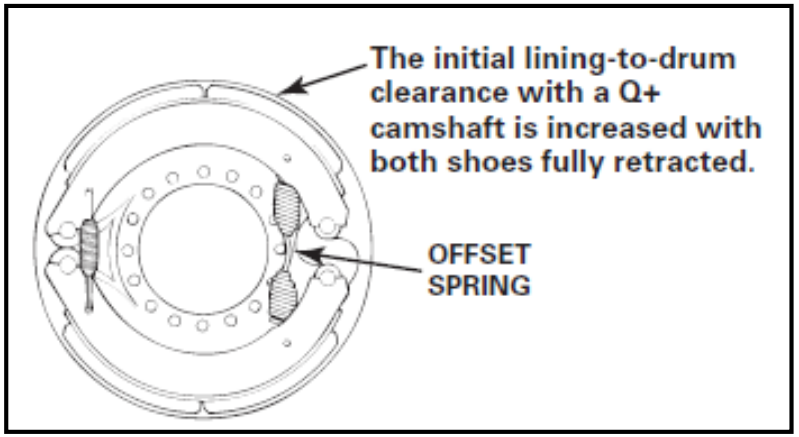
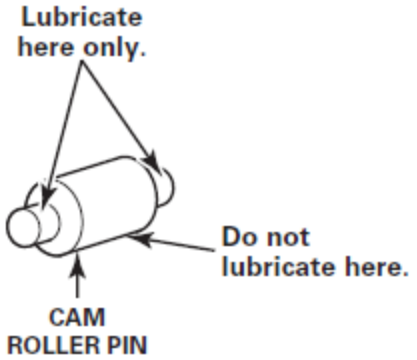
- **Reassembly tips:**
  - Lightly lubricate S-cam bushings and seal lips prior to S-cam installation
  - Do not use vice grips, side cutters or screw drivers to install springs
  - Remember to lube anchor pins and roller ends only
  - Rotate the S-cam so the brake shoes are down in each “Pocket” to make spring installation easier
  - Point the “open ends” of the return spring away from the center of the axle
  - Use recommended tools to make the job safer and easier





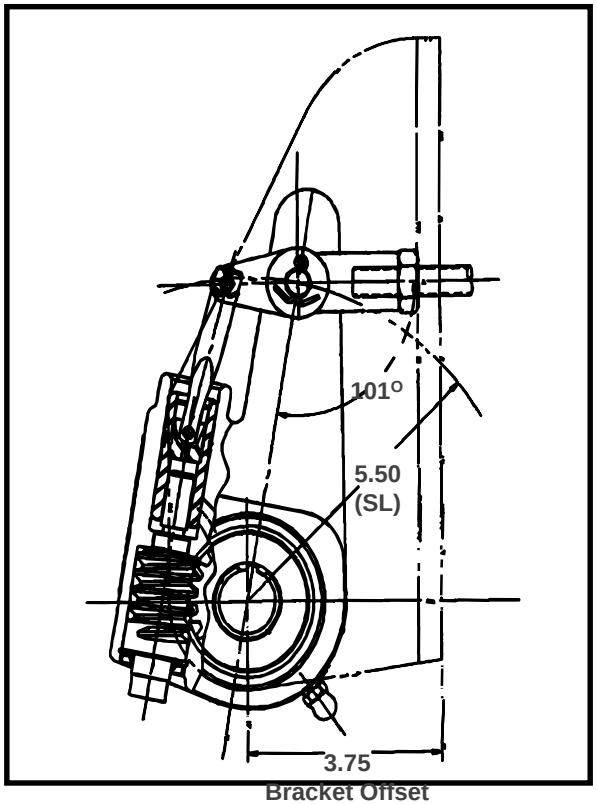
MERITOR
RUN WITH THE BULL



Apply Anti-Seize to the anchor pins and High heat grease to the ends of the brake rollers – NOT THE ROLLER BODY! Done at Meritor Plant!

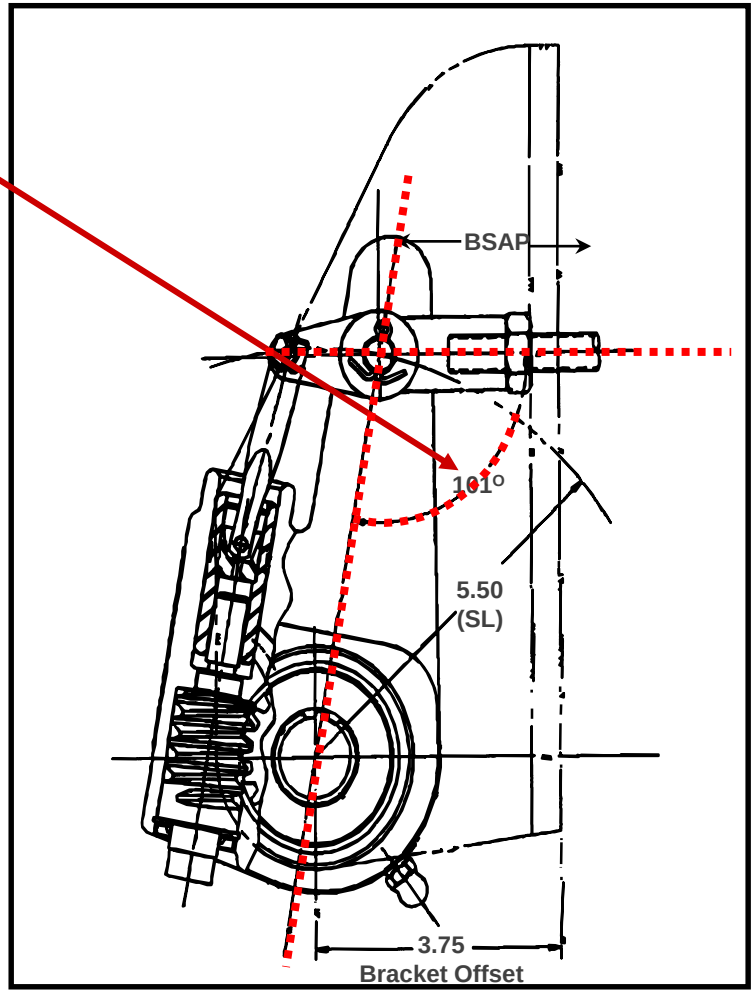
MERITOR
RUN WITH THE BULL

- With the brakes released, what angle is the automatic slack adjuster set at?
- This directly effects how the ASA will function



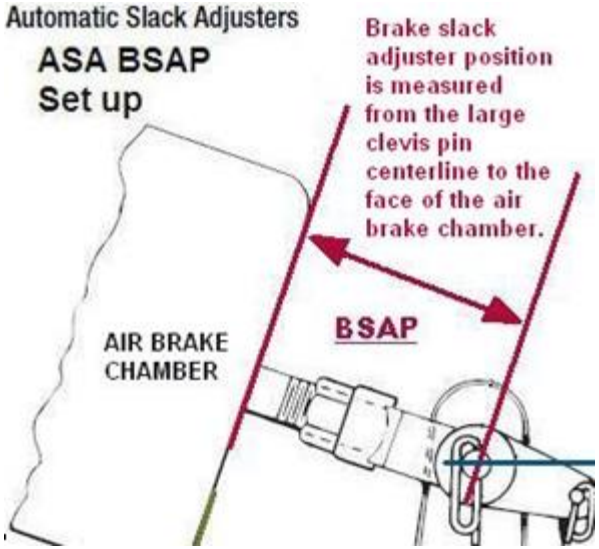
Meritor ASA's must be set at 101 degree angle on truck, tractor, bus and coach, 105 degrees on a trailer

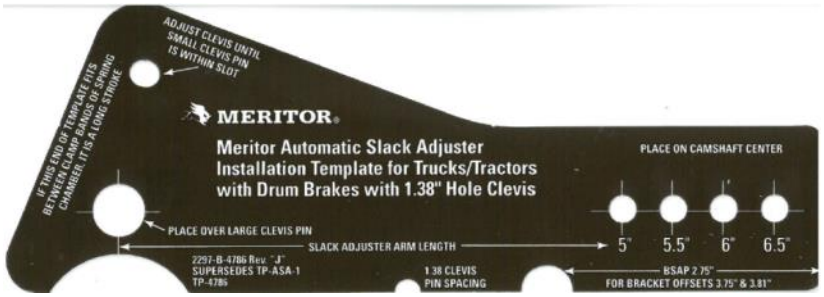
- Baseline 101 / 105 degrees.
- Less (95, 90 etc.) will create a tighter clearance.
- More (110, 115 etc.) will create a greater clearance.
- Proper ASA set up will allow a design clearance of .030" between the brake lining and the drum.

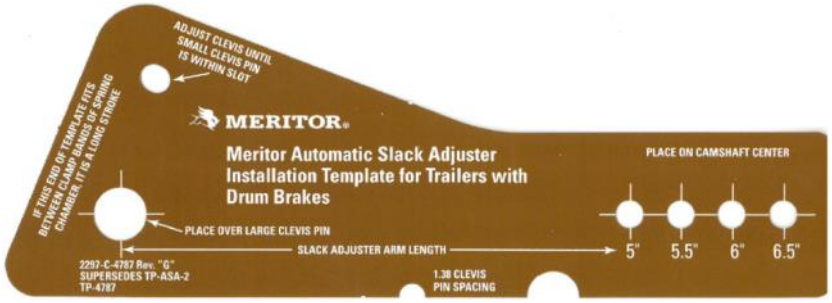


Meritor ASA set up

- Meritor ASA can be set up with two tools:
- Meritor ASA template
- Tape measure
    - BSAP-brake slack adjuster position







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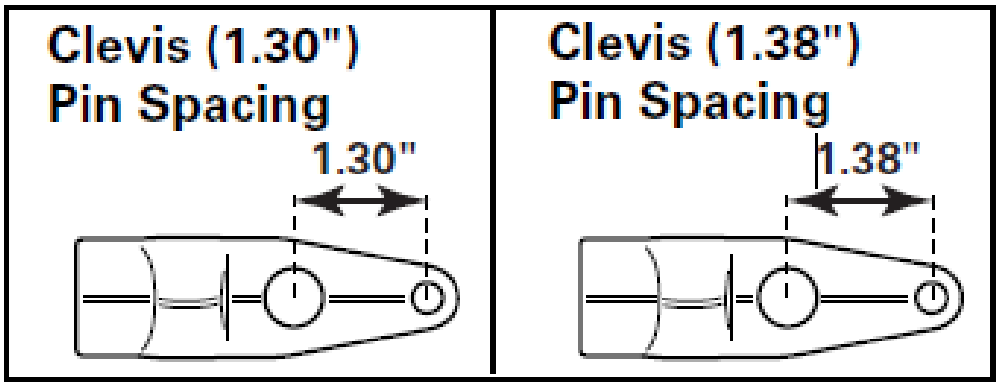
Clevis Design

- Since the development of the long stroke chamber in the industry, an additional brake clevis was created to allow proper set-up and operation of actuator type ASA's.
- The previous clevis was a 1.38 inch clevis (distance from centerline of each clevis pin). The new clevis is 1.30 inch or 0.080 inch less than the previous clevis. There are now 2 clevis' in the industry, the 1.38 and 1.30 inch.
- Each Clevis has a specific setting on the pushrod.
  - Truck / tractor: Brown or Grey Template or BSAP
  - Trailer: Tan Template



MERITOR
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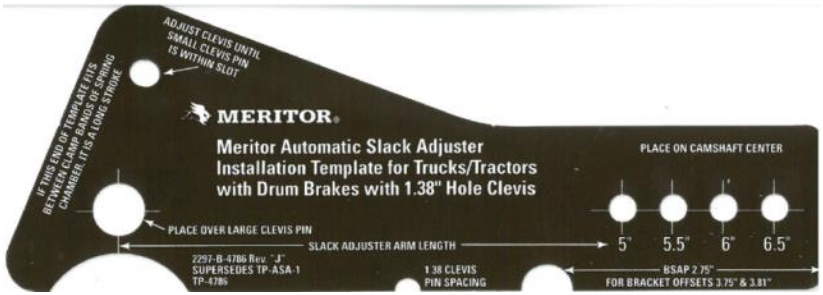
Meritor ASA Templates: Truck and Tractor Only



- The 1.38 inch clevis must be used with a BSAP of 2 ¾” using the Meritor dark brown ASA template (TP-4786).

- The 1.30 inch clevis must be used with a BSAP of 2 ¼” using the Meritor grey ASA template (TP-10130).

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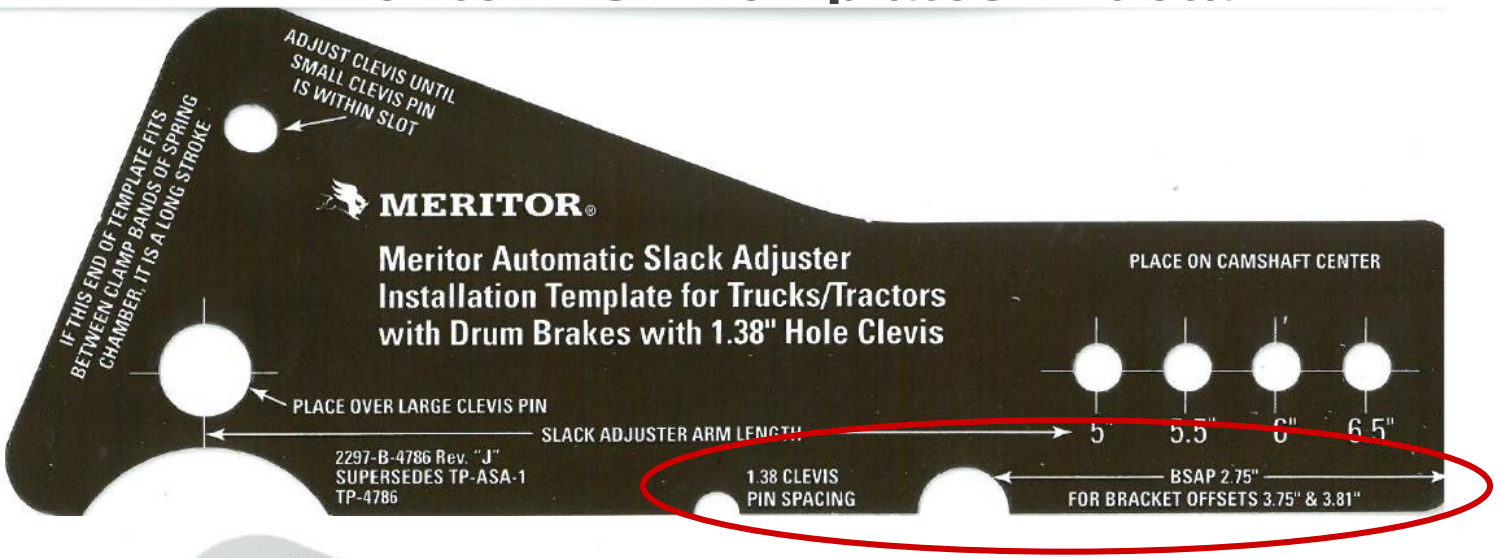
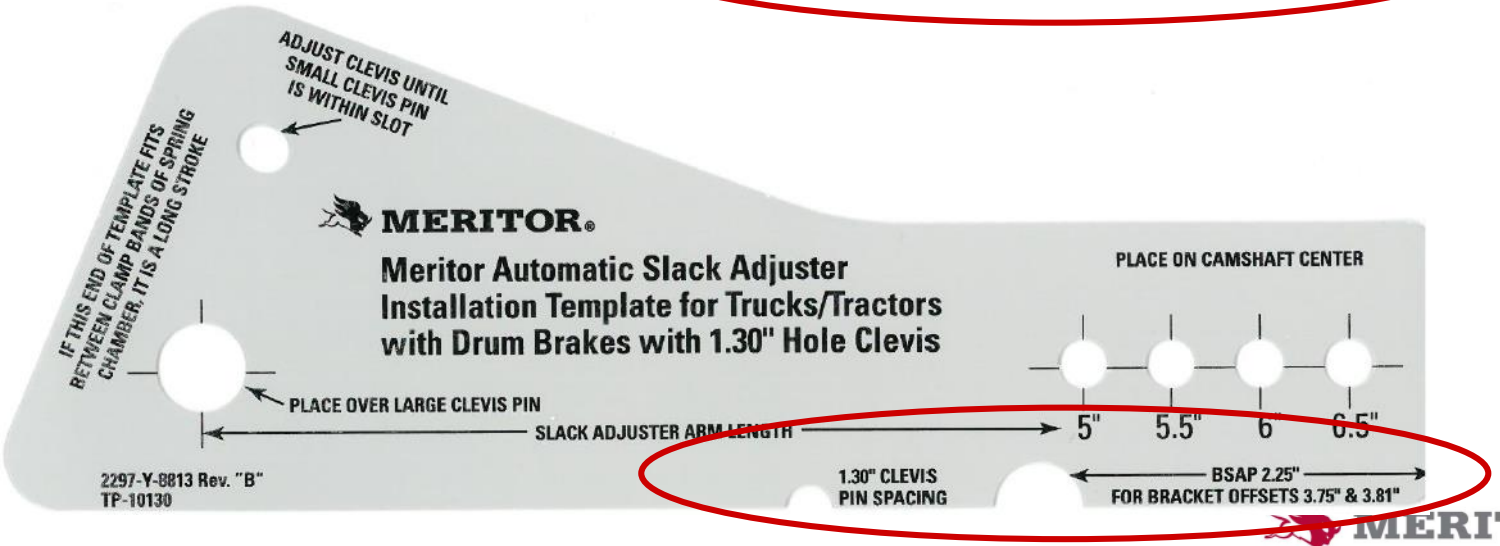
Meritor Stroke Sensing ASA

Meritor ASA Templates in detail





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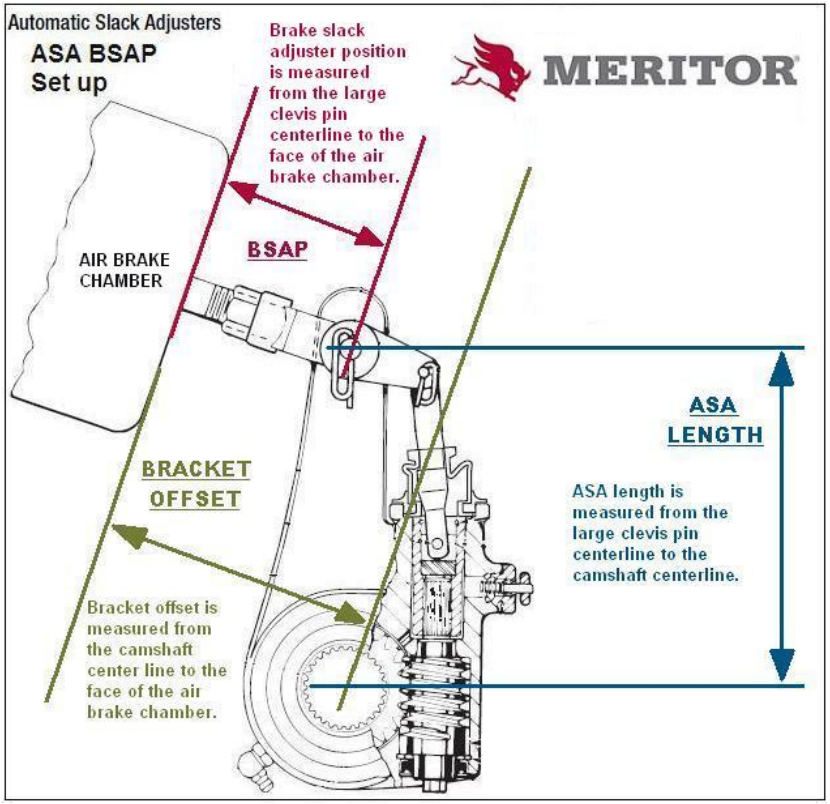
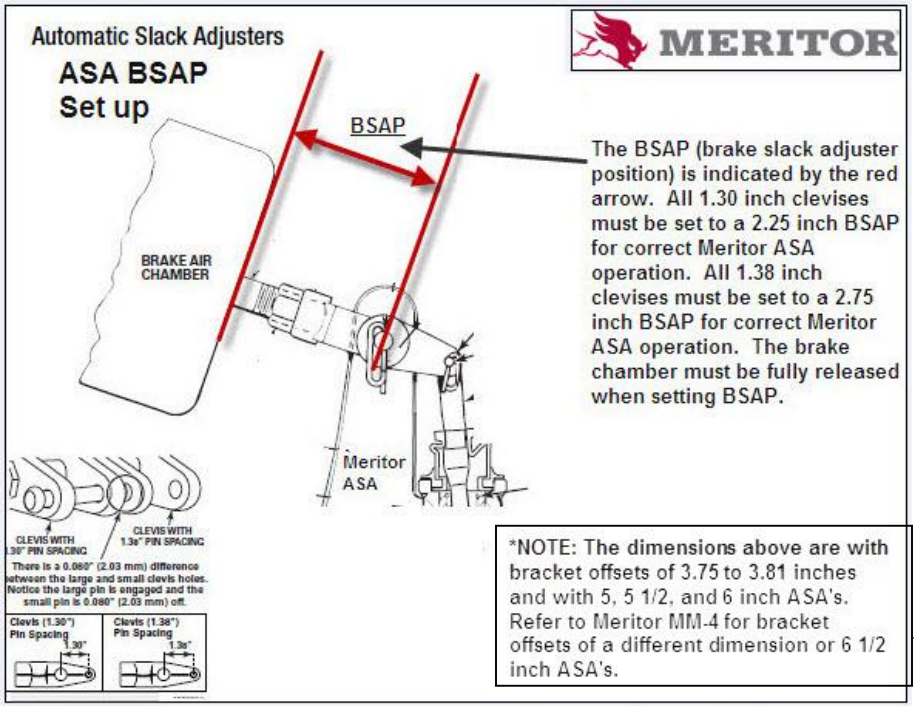
Refer to Meritor MM-4 for other ASA lengths and chamber bracket offsets.





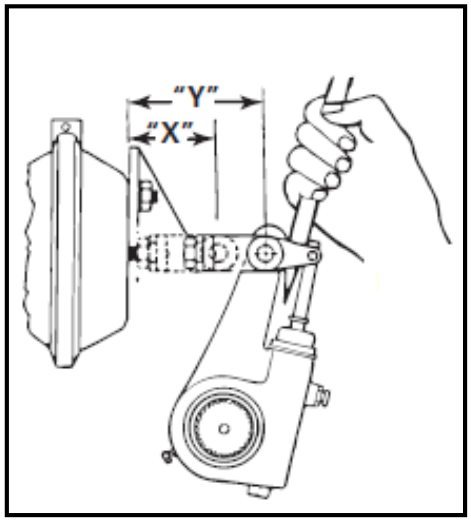
Manual Adjustment:

- Turn manual adjusting nut counter-clockwise until the linings touch the drum
- Turn the adjusting nut 1/2 turn for drum brakes

Manual Adjustment

Free Stroke Check:

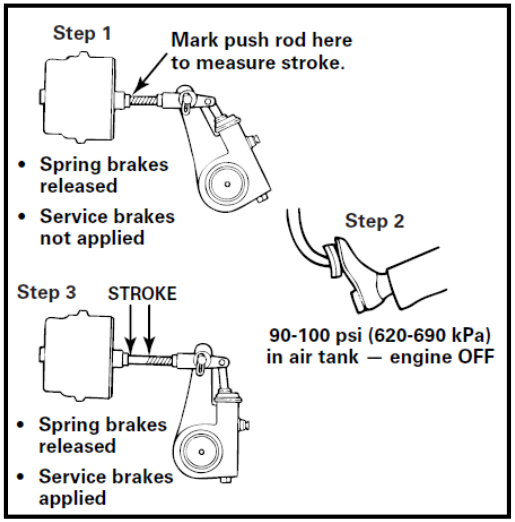
- With parking brakes released
- Pull the pushrod out until linings touch the drum
- Must be ½” to 5/8” movement



Free Stroke

Applied Stroke Check:

- With parking brakes released
- Air system regulated to 90-100 PSI
- Verify applied stroke is within limits based on chamber size and type



Applied Stroke

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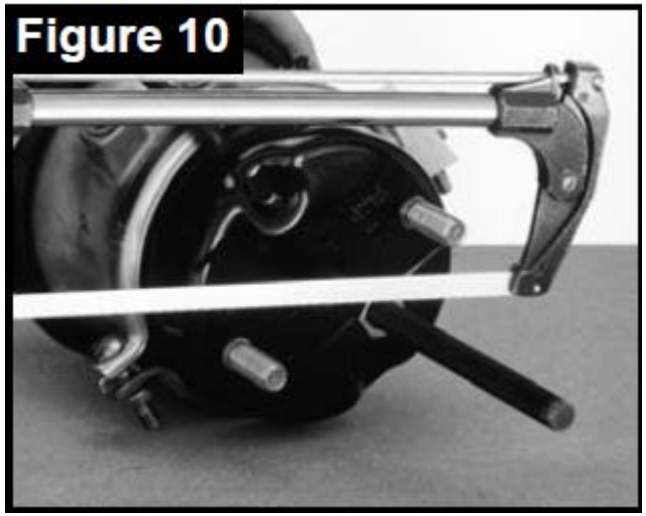
*Always thread jam nut on before cutting to aid in cleaning threads from the cutting process

*Spring brake must be fully caged and released before cutting pushrod



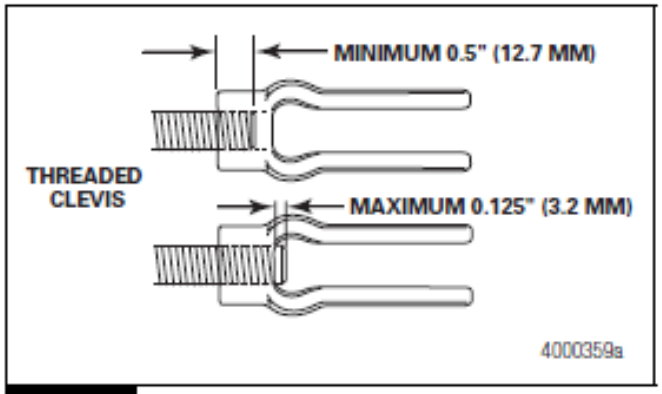


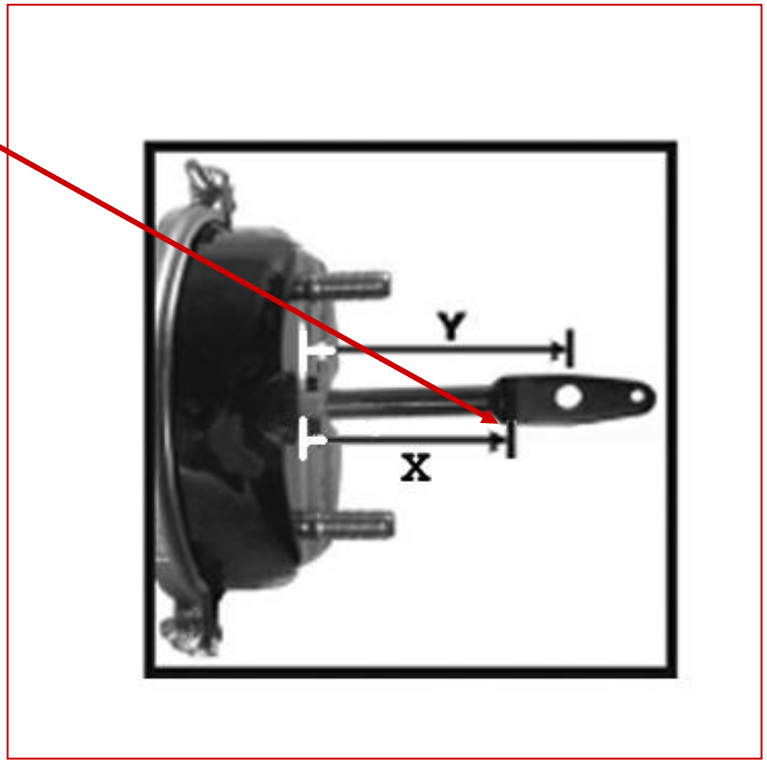
Figure 5.17

6. Verify that the push rod does not extend through the clevis more than 0.125-inch (3.2 mm).
   - **If the push rod extends through the clevis more than 0.125-inch (3.2 mm):** Cut the push rod or install a new air chamber and push rod.

MERITOR
RUN WITH THE BULL

- Proper measurement is critical to brake performance

- Cut at X on new chamber
- Ensure new chamber is fully released before cutting

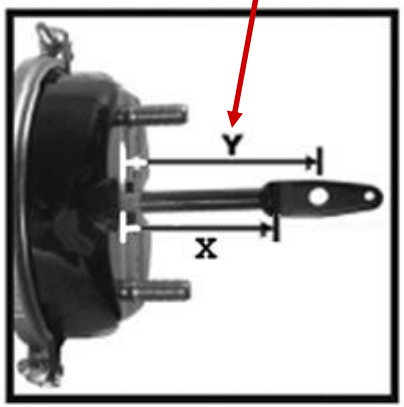


MERITOR
RUN WITH THE BULL

- Be aware of other BSAP dimensions.
- This is a partial list only.

MGM Welded Yoke Application Guide

Stroke	Model	Y-Dimension	Application
2.5"	C30	2.25"	Most
3.0"	TR3030LP3	3.063"	Thomas Bus
3.0"	TR3030LP3T	2.87"	Autocar, Paccar
3.0"	TR3030LP3THD	4.20"	Mack



MERITOR
RUN WITH THE BULL

Replacing a Brake Chamber

- Proper measurement is critical to brake performance
  - Cut at X on new chamber
  - **Ensure new chamber is fully released before cutting**

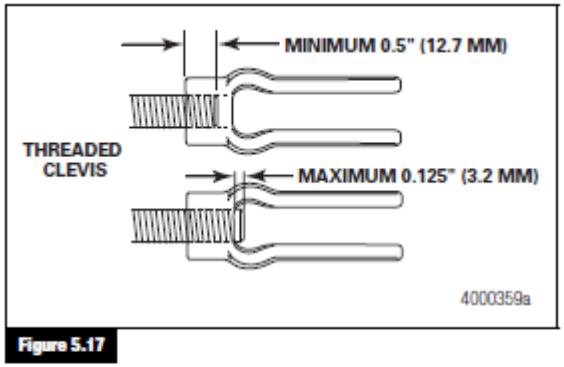


Figure 5.17

6. Verify that the push rod does not extend through the clevis more than 0.125-inch (3.2 mm).
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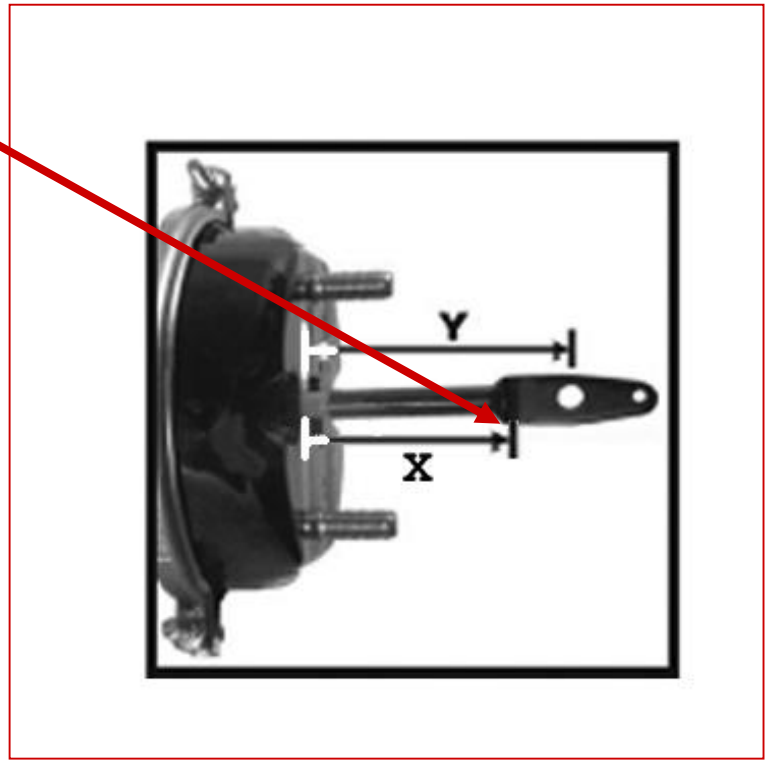

MERITOR
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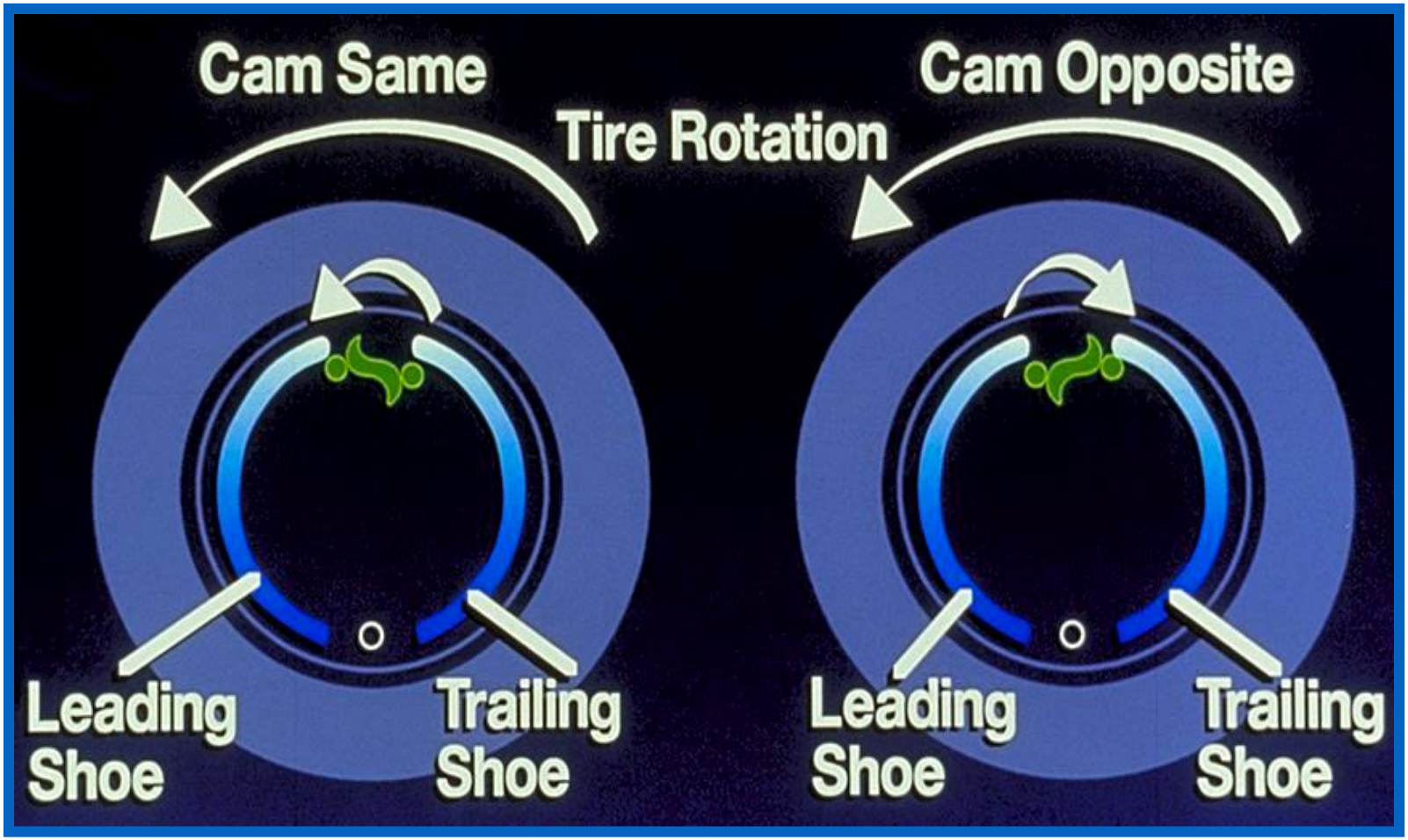
Brake Camshaft

Cam Rotation



MERITOR
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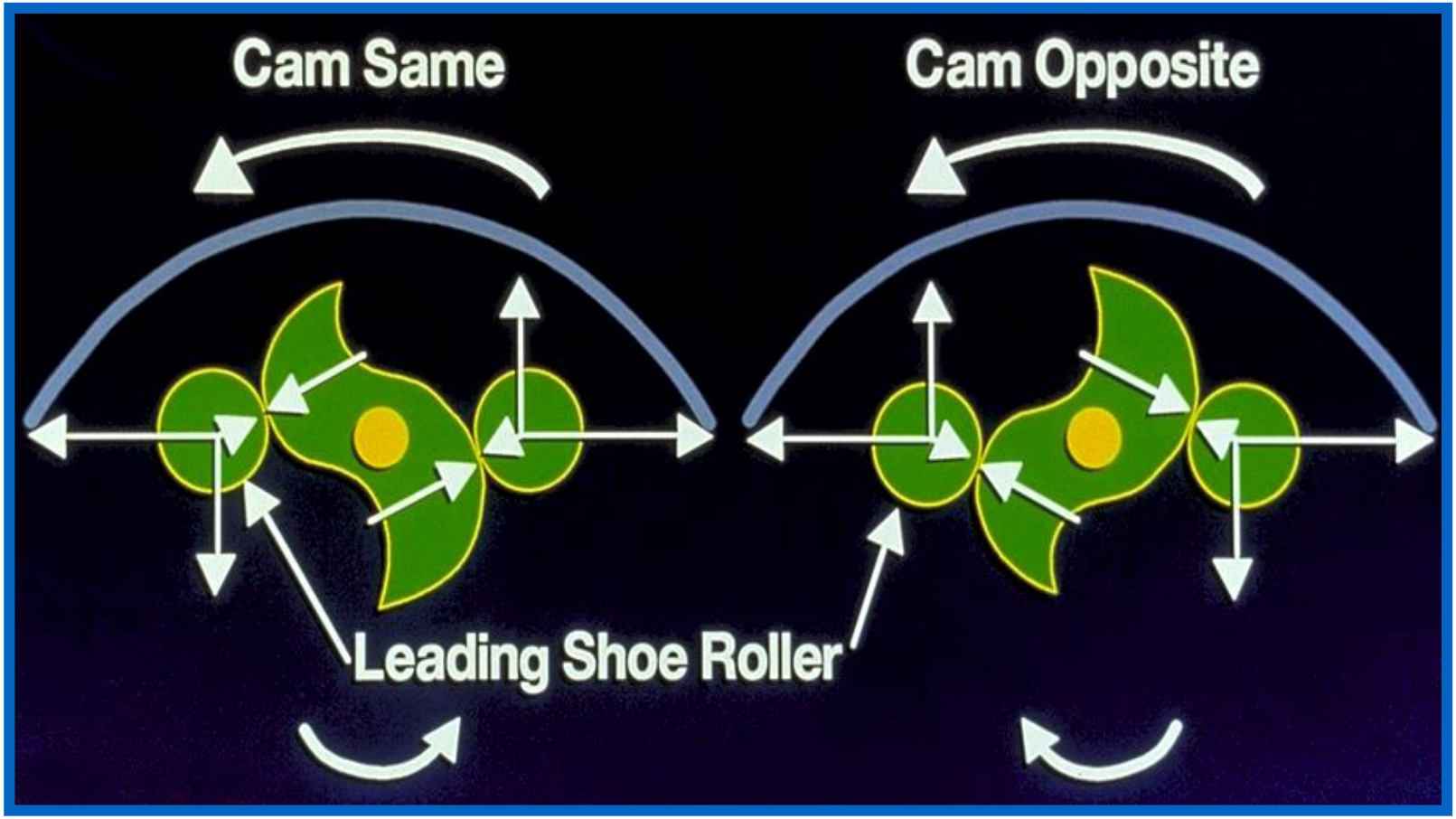
Brake Camshaft

Vector* Comparison



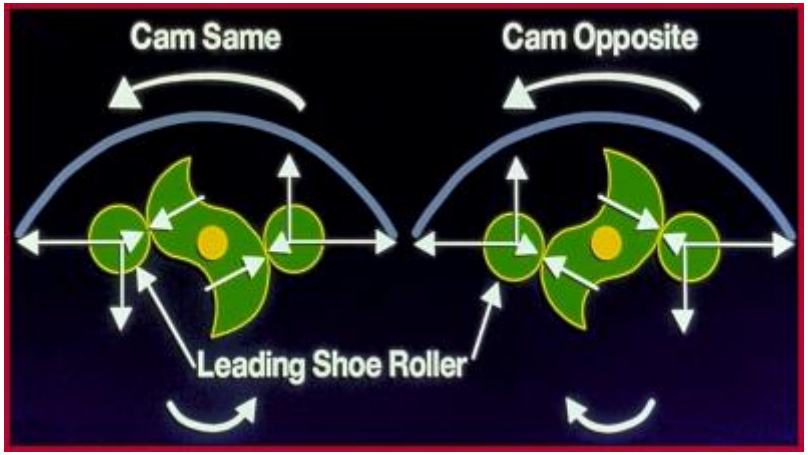
*Vector: A force with both length and direction

MERITOR
RUN WITH THE BULL

Cam Rotation

Q: Why have a cam opposite brake if it is a disadvantage?

A: Some suspension systems do not have enough clearance to allow the chamber brackets to be mounted in the proper location to allow cam same brakes.



MERITOR
RUN WITH THE BULL

Meritor ASA under adjusting

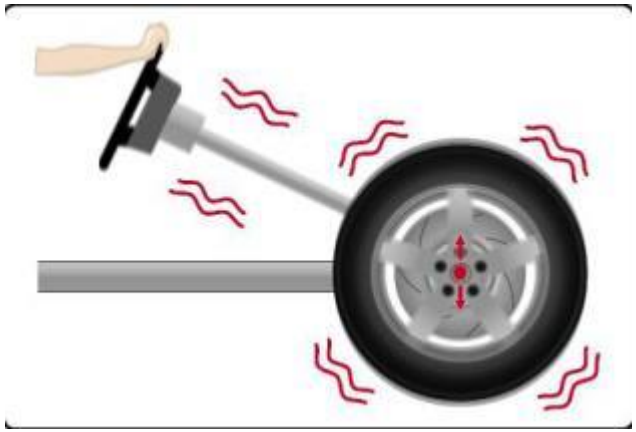
- ASA ***set up*** issue, brake system issue, chamber issue, incorrect ASA application (length/piston color).
  - **DO NOT** adjust brakes and let go, fix the problem.

Diagnostics

- Check ASA set up with template, procedure or by dimensional set up (BSAP).
- Check for excessive looseness in the camshaft splines, camshaft bushings, or clevis pin.
- Check for weak brake shoe return spring or brake chamber return spring.
- Check for inoperative automatic slack adjuster.
- Check for incorrect ASA application (length/piston color).

Brake Noise / Shimmy

Symptom:
Shimmy or vibration occurs when brakes are applied.



Possible Causes:

- Radial wheel end runout is excessive (as measured on the friction surface of an assembled drum).
- The hub-piloted brake drum is mounted incorrectly.
- Wheel bearing end play is excessive.
- Brake drum runout is over 0.020" (0.508 mm).
- Drum is out of balance or missing weights.
- Discrepancies exist in brake adjustment.
- Brake wear is inconsistent.
- Brake components (i.e. springs, rollers retainers) are broken or missing
- Different length slack adjusters are used on the same axle.
- Different brake chamber sizes are used on the same axle.
- Brake attaching hardware is broken, loose or missing.
- Wheel/Tire lateral or radial runout is excessive.
- Vehicle is out of alignment.
- Steering or suspension hardware or components are loose.

MERITOR
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Brake Pull (balance)

Symptom:

Brake squeal/

chatter/noise

occurs upon brake application.

Possible Causes:

- Brake components (i.e. springs, rollers retainers) are broken or missing.
- Brake attaching hardware is broken, loose or missing.
- Brake wear is inconsistent.
- Linings are glazed (20% or less of lining friction surface).
- Linings are glazed (greater than 20% of lining friction surface).
- Lining selection is incorrect.
- The drum brake surface is aligned with shoe high spots on the brake lining.

MERITOR
RUN WITH THE BULL

Rockwell ADB 1560 Model ADB

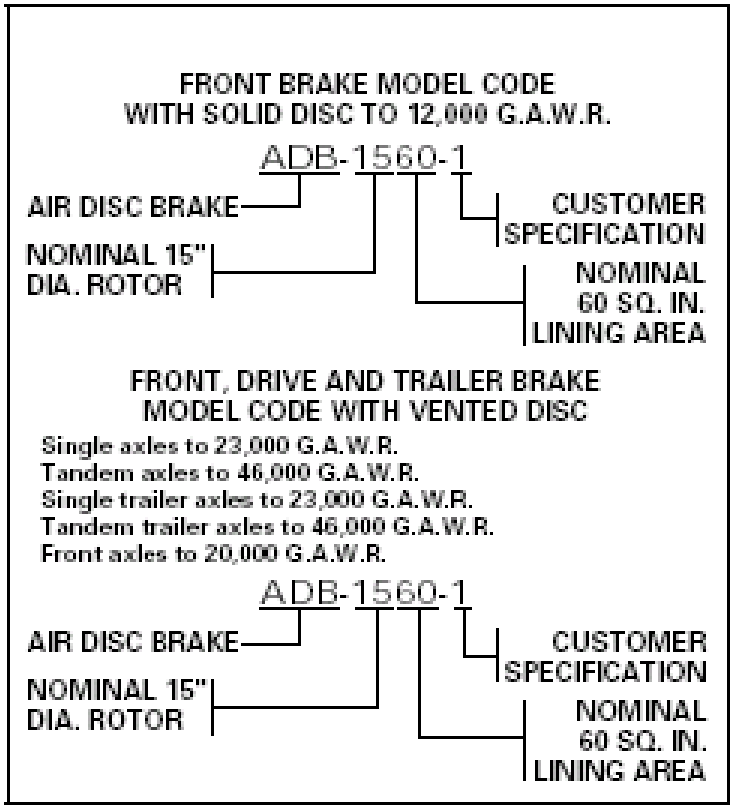
Specialty Commercial Vehicles

Rockwell ADB 1560 Model Air Disc Brake

- Manufacturer- Rockwell (Meritor)
- Production Years- 1981 to 2007
- Typical Application- Fire Truck
- Maintenance Manual 4M
- Service Kits Parts Catalog-PB-8857

MERITOR
RUN WITH THE BULL

Rockwell ADB 1560 Model Air Disc Brake



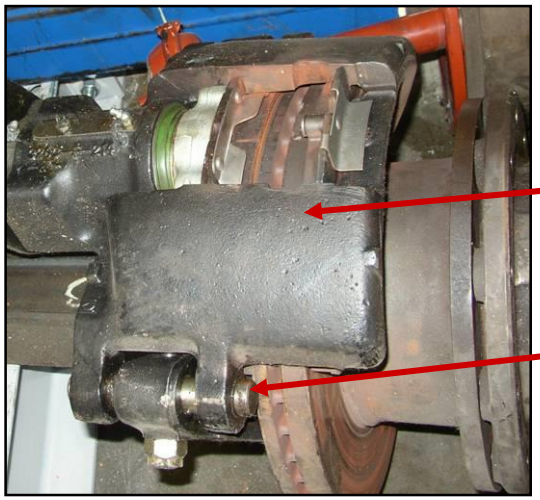
Models

- ADB 1540
- **ADB 1560 (most common)**
- ADB 1760

Ref. Maintenance Manual 4M

MERITOR
RUN WITH THE BULL

Rockwell ADB 1560 Model Air Disc Brake

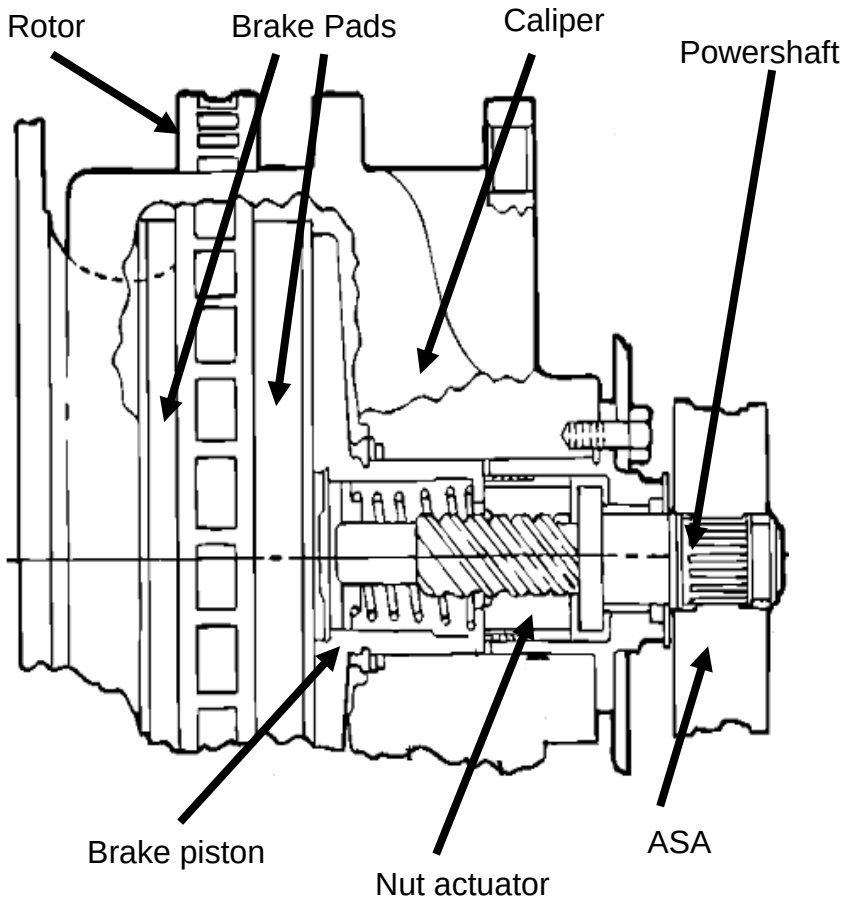


- Meritor Automatic Slack Adjuster
  - Front steer axle
    - Green piston
  - Rear drive axle with T30 chamber
    - Blue piston
- Single piece bridge and carrier
- Exposed slide pins

MERITOR
RUN WITH THE BULL

Rockwell ADB 1560 Model Air Disc Brake

Operation



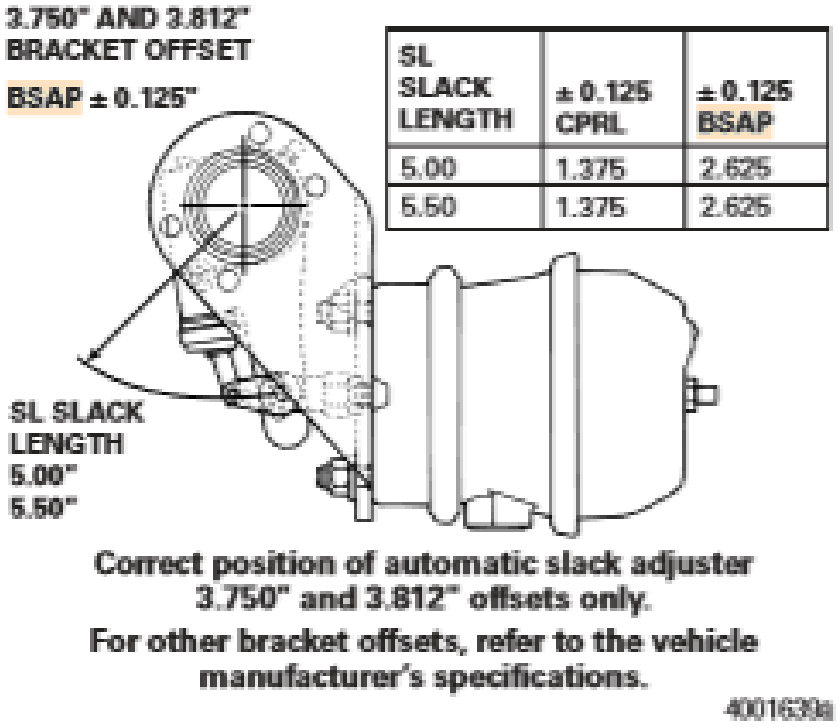
- **The air chamber push rod rotates the ASA attached to the powershaft.**
- **The powershaft threads the nut actuator towards the rotor.**
- **The nut actuator forces the brake piston and inboard lining against the rotor.**
- **The force between the inboard lining and rotor pulls the caliper along the slide pins and pulls the outboard lining into the rotor.**

Ref. Maintenance Manual 4M

MERITOR
RUN WITH THE BULL

Rockwell ADB 1560 Model Air Disc Brake

- **Installation of ASA**
  - **Release spring brake.**
  - **Install ASA, spacer washers, and snap ring.**
  - **Set BSAP**
  - **ASA clearance: check for 0.062” of clearance between washer & snap ring.**



SL SLACK LENGTH	± 0.125 CPRL	± 0.125 BSAP
5.00	1.375	2.625
5.50	1.375	2.625

Correct position of automatic slack adjuster 3.750" and 3.812" offsets only.

For other bracket offsets, refer to the vehicle manufacturer's specifications.

4001639a

MERITOR
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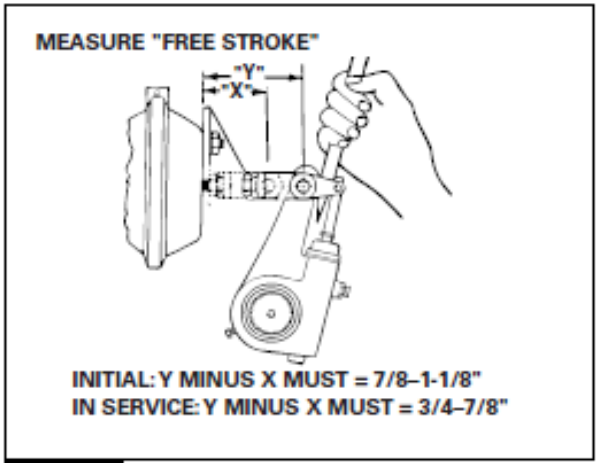
Rockwell ADB 1560 Model Air Disc Brake

- **Checking Brake Free Stroke**
  - **Clearance between lining and rotor.**
  - **Initial Free Stroke of 7/8”-1 1/8”.**
  - **In service Free Stroke of 3/4”-7/8”.**



MERITOR
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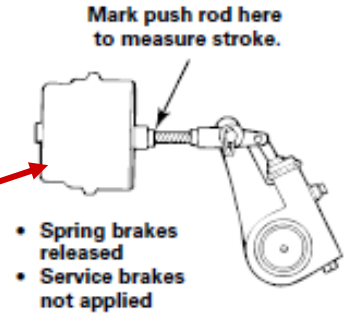
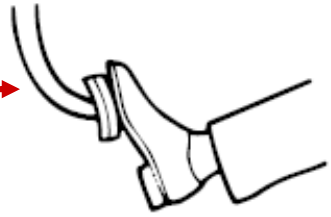
Rockwell ADB 1560 Model Air Disc Brake

- **Checking Brake Applied Stroke**
  - **Measure pushrod w/brake released.**
  - **Apply 100 psi brake pressure.**
  - **Measure pushrod w/brake applied.**





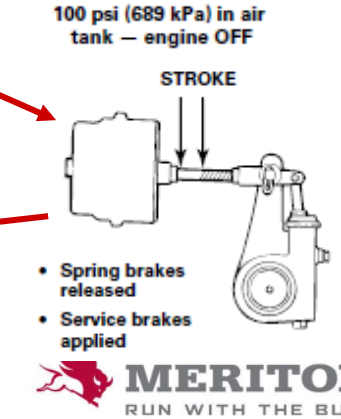


Table E: "Standard Stroke" Clamp-Type Brake Chamber Data

Type	Outside Diameter (inches)	Brake Adjustment Limit (inches)
16	6-3/8	1-3/4
20	6-25/32	1-3/4
24	7-7/32	1-3/4
30	8-3/32	2
36	9	2-1/4

Table F: "Long Stroke" Clamp-Type Brake Chamber Data

Type	Outside Diameter (inches)	Brake Adjustment Limit (inches)
16	6-3/8	2.0
20	6-25/32	2.0
24	7-7/32	2.0
24*	7-7/32	2.5
30	8-3/32	2.5

* For 3" maximum stroke type 24 chambers

MERITOR
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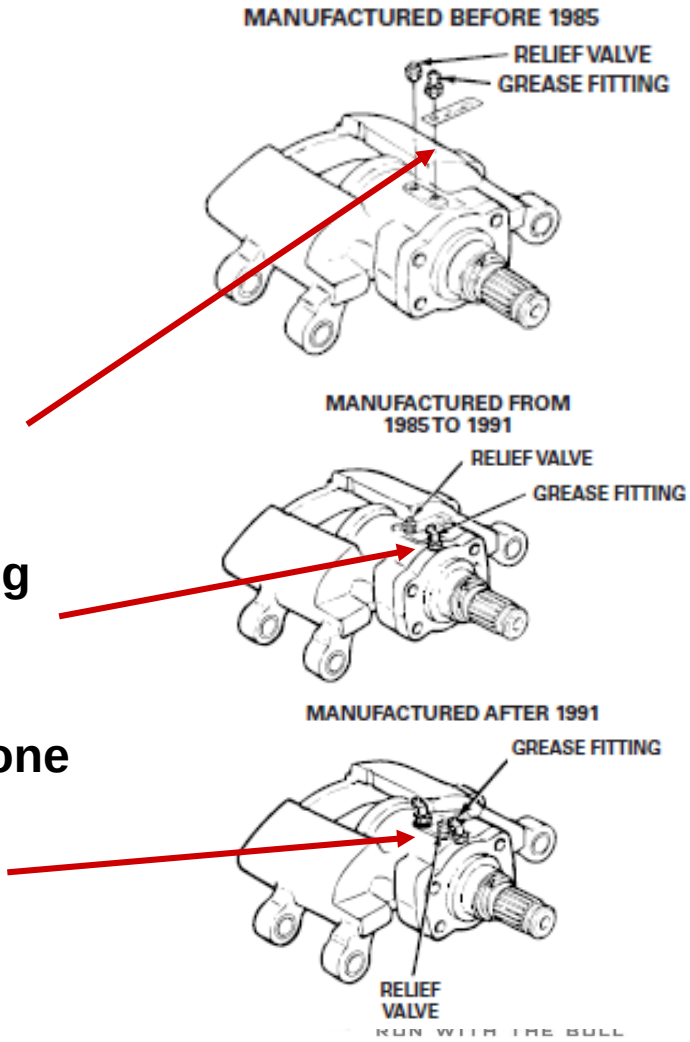
Rockwell ADB 1560 Model Air Disc Brake

- **Lubrication of Caliper**
  - **3 Designs**
    - **Before 1985 – One Grease Fitting on caliper w/ Relief Valve**
    - **1985 to mid 1992 – One Grease Fitting on powershaft cap w/ Relief Valve**
    - **1992 to 2007 – Two Grease Fittings, one on caliper and one on cap w/ Relief Valve**



Rockwell ADB 1560 Model Air Disc Brake

- **All Designs**
  - Turn adjuster to extend powershaft; linings contacting the rotor.
  - Hold finger over relief valve and lubricate fitting(s) until new grease flows from the seal at the Powershaft cap (if 2 fittings, grease caliper fitting first then cap fitting).
  - Remove relief valve and disengage pull pawl.
  - Bleed or Force any excess grease from Caliper by turning ASA adjusting nut to retract lining from rotor.
  - Clean Excess Grease.
  - Install Relief Valve.
  - Adjust Brake Lining to Rotor Clearance.

Rockwell ADB 1560 Model Air Disc Brake

- **Other Lubrication**
  - **Slide Pins require NO lubricant**
    - **Make certain they are clean and dry.**
    - **Slide pins will attract dirt, sand, etc. if lubricated.**

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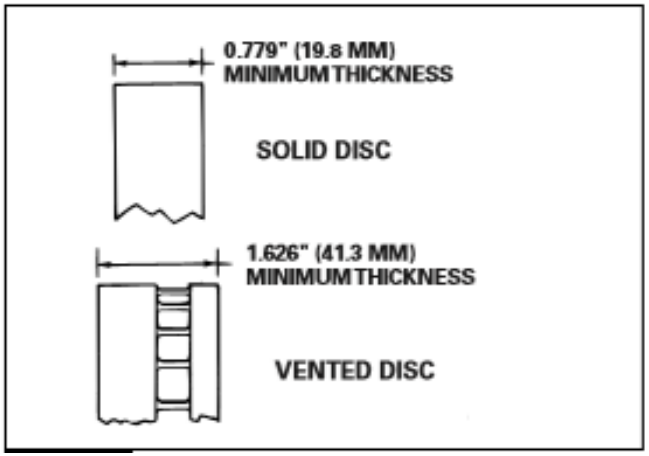
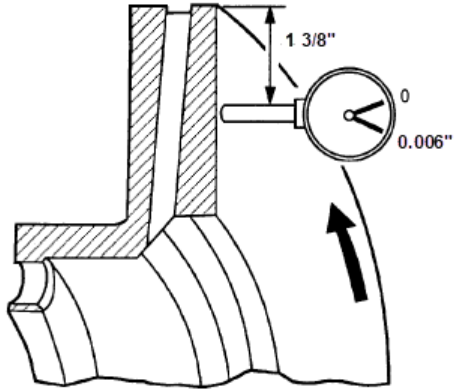
Rockwell ADB 1560 Model Air Disc Brake

Preventive Maintenance-Wheels Off

Rotor Measurements





Solid Minimum = 0.779”

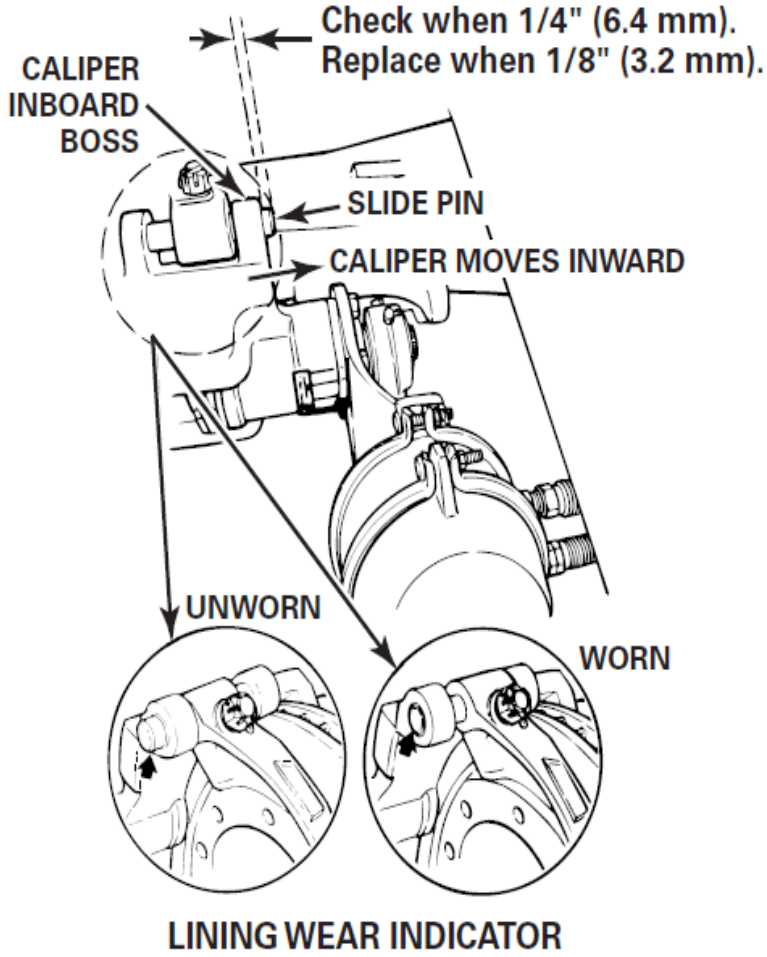
Vented Minimum = 1.626”

Maximum = 0.020”- TIR

MERITOR
RUN WITH THE BULL

Rockwell ADB 1560 Model Air Disc Brake

- **Available Lining**
  - **Direct visual inspection (1/8” of slide pin visible inboard, wheel off inspection required.**
- **Running Clearance**
  - **In service free stroke 3/4” to 7/8”**
- **Seized mechanism**
  - **The brake lever should be able to cycle by hand with the clevis detached and pads removed**
- **Slide pins**
  - **The caliper should slide freely by hand with the pads removed**

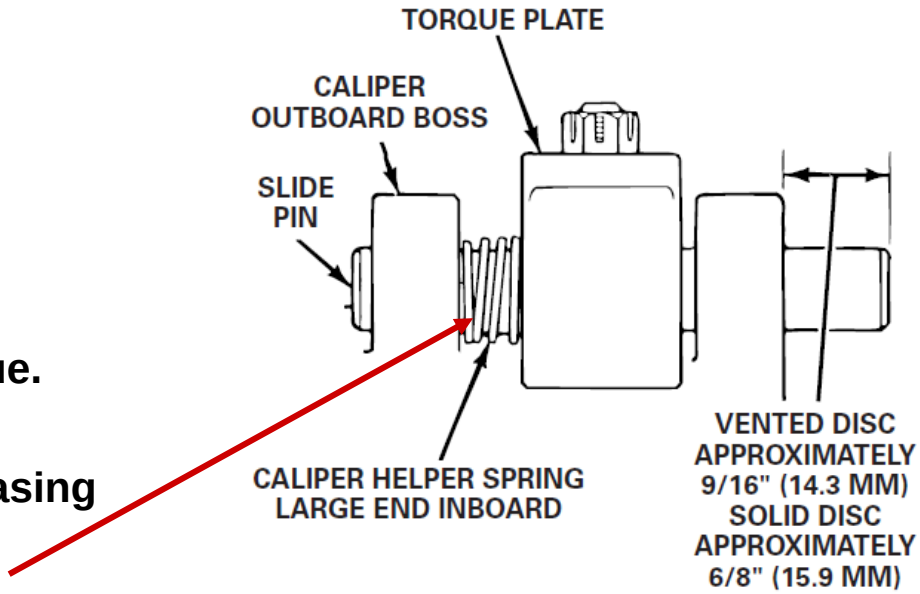


LINING WEAR INDICATOR

MERITOR
RUN WITH THE BULL

Rockwell ADB 1560 Model Air Disc Brake

- **Dragging brake, caliper hanging up, brake not releasing.**
  - **Check slide pin condition.**
  - **Check slide pin bushing wear.**
  - **Check chamber for release issue.**
  - **Check for improper caliper greasing technique.**
  - **Check or install slide pin return helper springs. Small end outboard, large end inboard.**



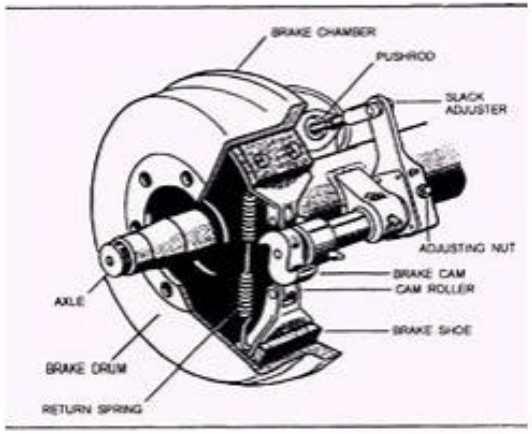
MERITOR
RUN WITH THE BULL

EX-225 Air Disc Brake

- Component Overview
- Serviceability Features
- Visual Pad Wear Indicator
- Wheels-On Inspection

Brake System Efficiency

Cam



Cam=55% Efficient

Wedge

Wedge=90% Efficient

Disc

Disc=93+% Efficient

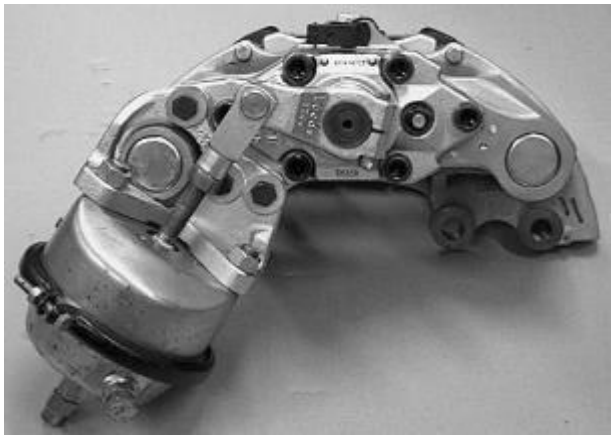
MERITOR
RUN WITH THE BULL

Air Disc Brake Evolution

1980

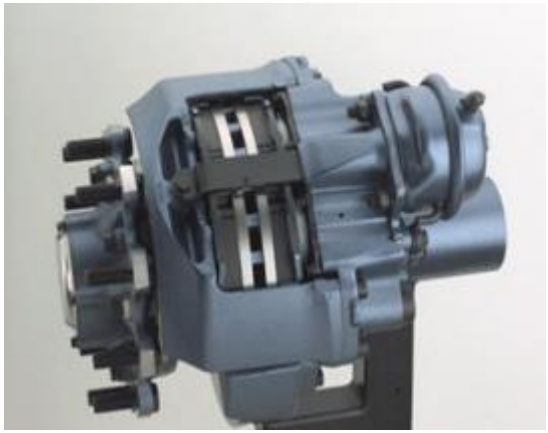
External Slack
External Auto Adjust

1990



External Lever
Internal Auto Adjust

2000

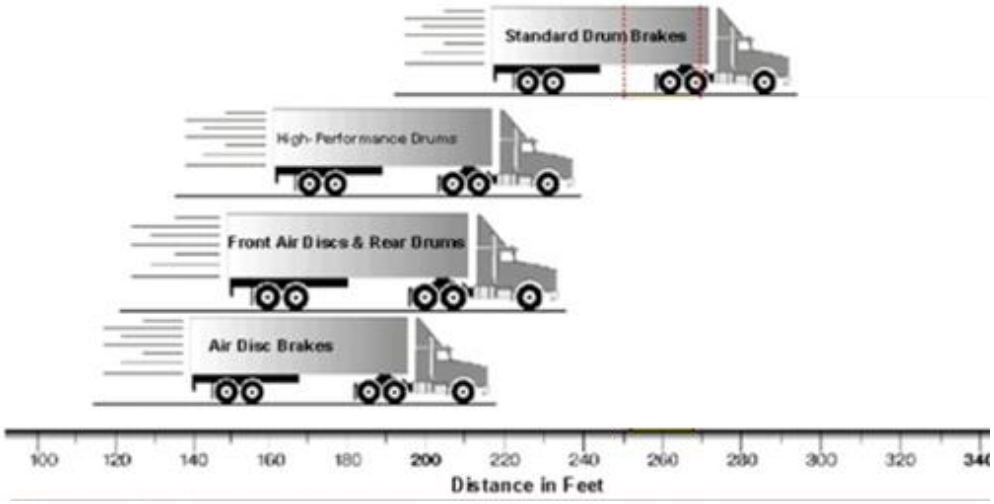


Internal Lever
Internal Auto Adjust

MERITOR
RUN WITH THE BULL

Performance

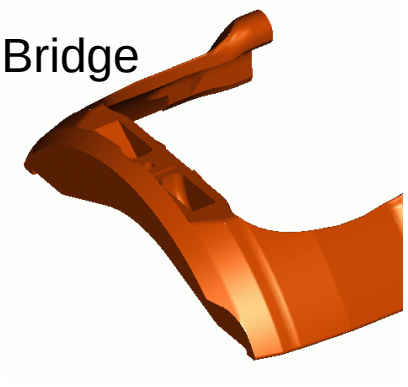
- Disc brakes are more efficient than drum brakes.
- Disc brakes perform with virtually no fade.
- Disc brakes perform better in wet conditions.
- Disc brake shoe (pad) replacement is a simple task.



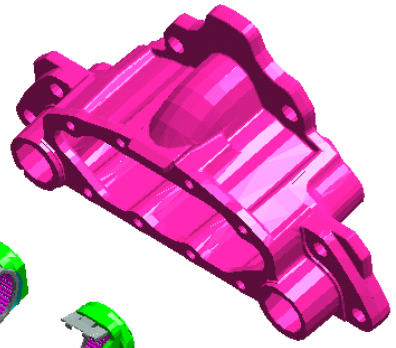
MERITOR
RUN WITH THE BULL

Air Disc Brakes Common Components.

Bridge

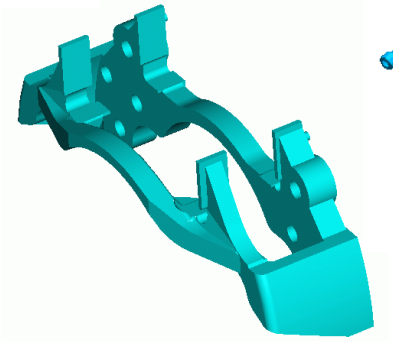


Caliper



Brake pads, hold down springs and hold down bracket.

Carrier



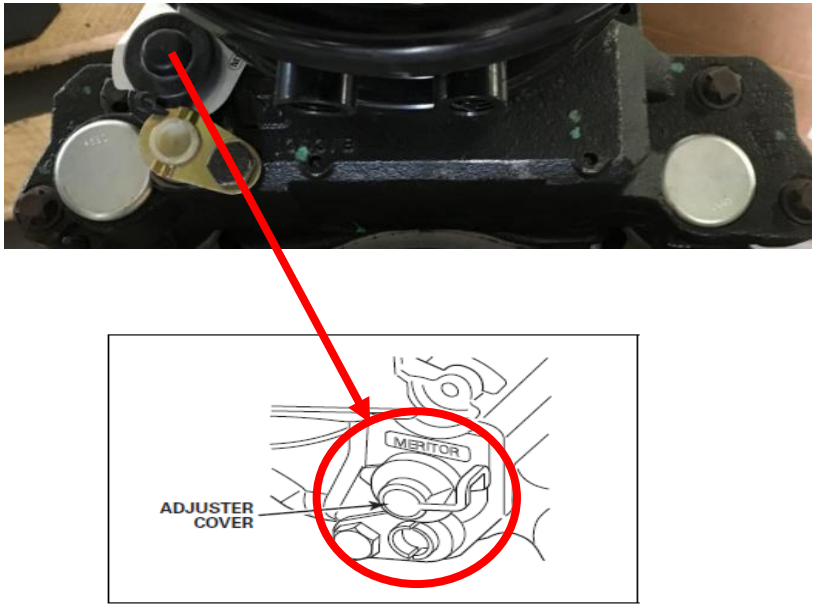
Operating lever, bearings, pistons or tappets, seals, self adjuster, manual adjuster.

MERITOR
RUN WITH THE BULL

Meritor EX Identification

Caliper Identification

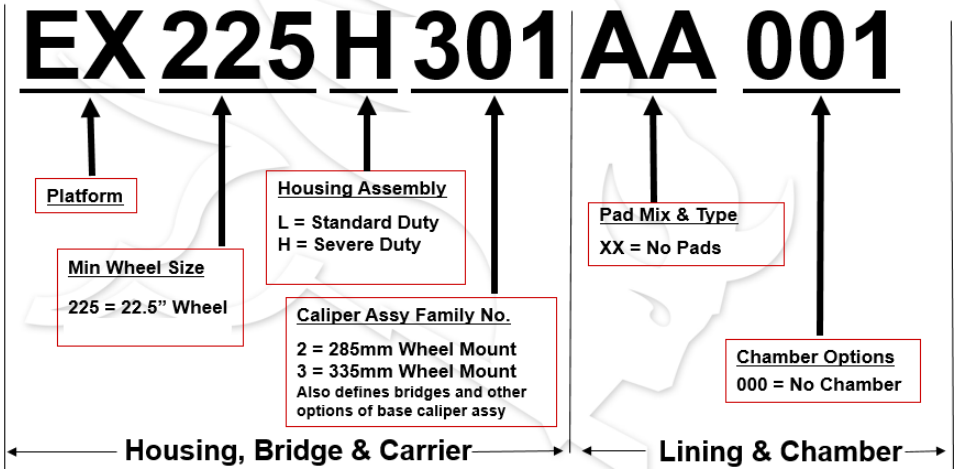
Meritor ADB rear view.
1- Adjuster cover.
2- Solid cast housing.
3- Slide pin caps.
4- Electronic wear sensor plug.



MERITOR
RUN WITH THE BULL

Meritor EX Nomenclature

Caliper Identification



Use model number for parts procurement.

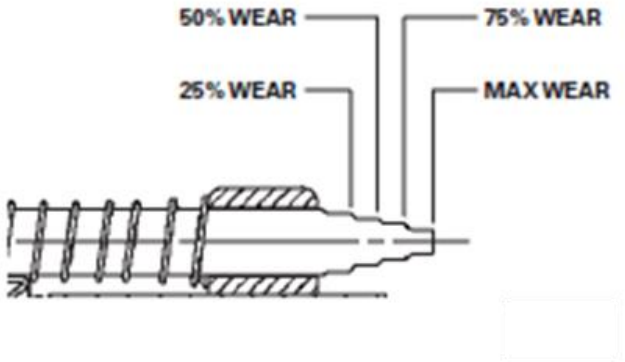
MERITOR
RUN WITH THE BULL

MERITOR
RUN WITH THE BULL

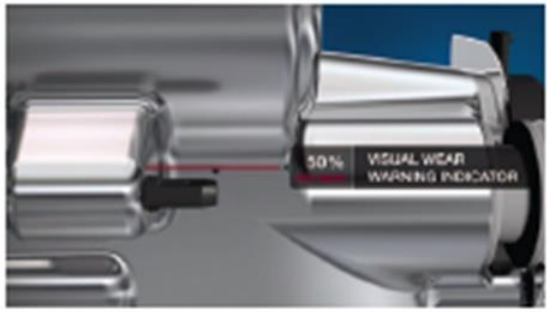
EX-225 Serviceability Features

- Visual wear indicator reduces brake inspection time

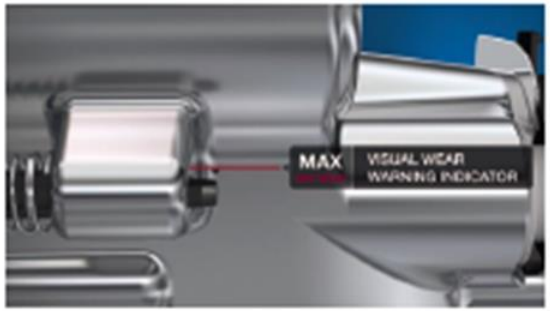
- Visual wear indicator helps measure brake wear without removing the wheel from the vehicle



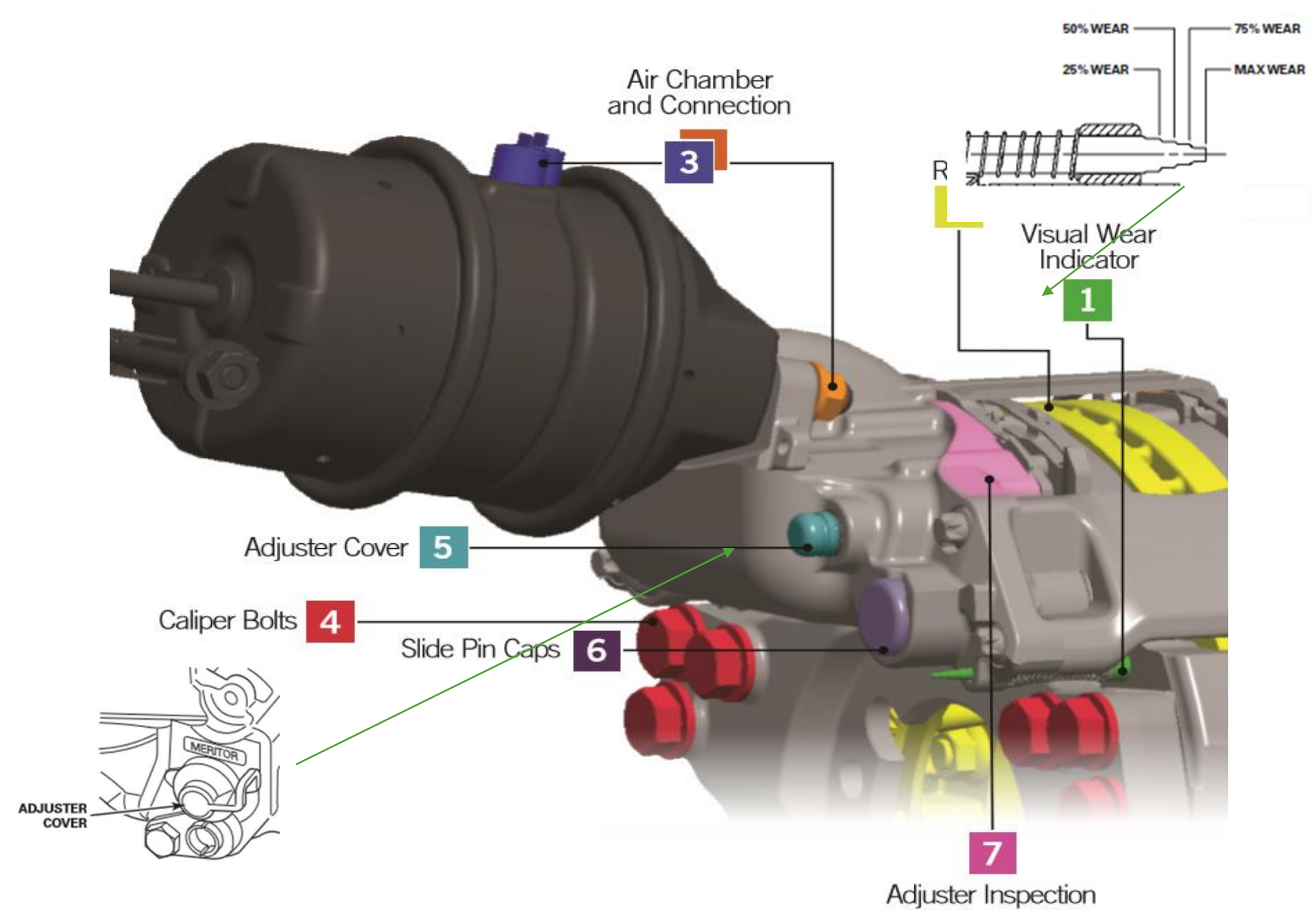
New Pad



50% Life

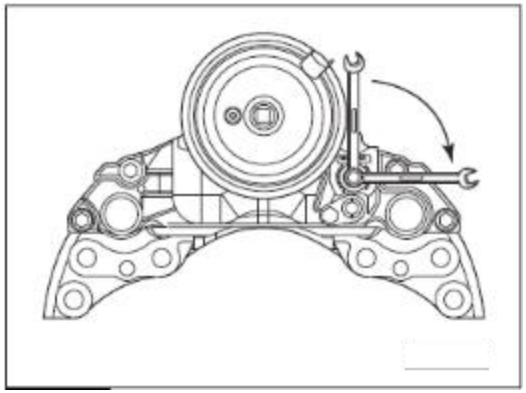


Max Wear



EX-225 Wheels On Inspection (Continued)

Adjuster Mechanism Operation Check



1.Deadjust the brake ¼ turn counter-clockwise.

2. Apply 1-2 moderate brake applications.

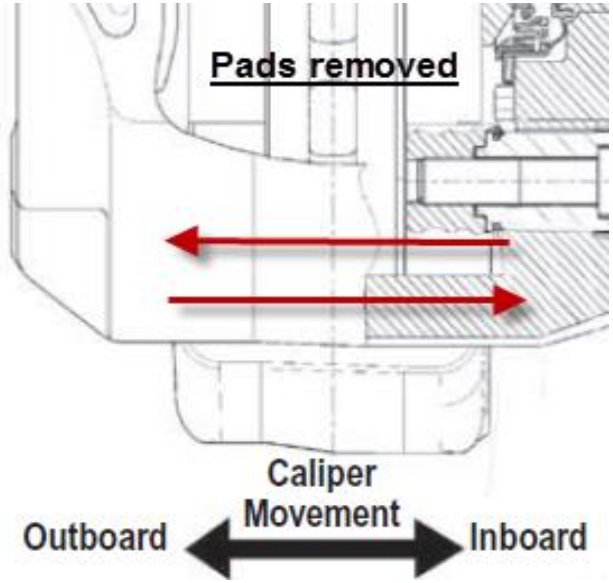
3. The wrench must move clockwise as the running clearance is diminished.

MERITOR
RUN WITH THE BULL

Wheels-Off Inspection

Preventive Maintenance-Wheels Off

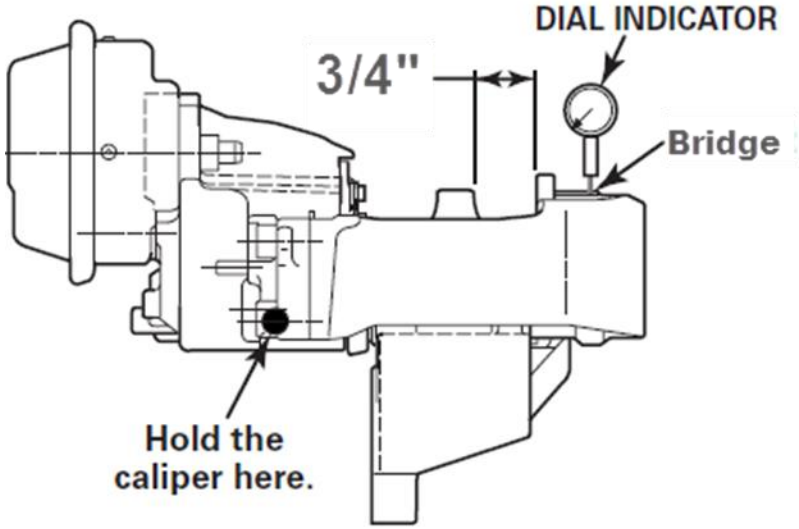
Caliper Free Sliding Motion

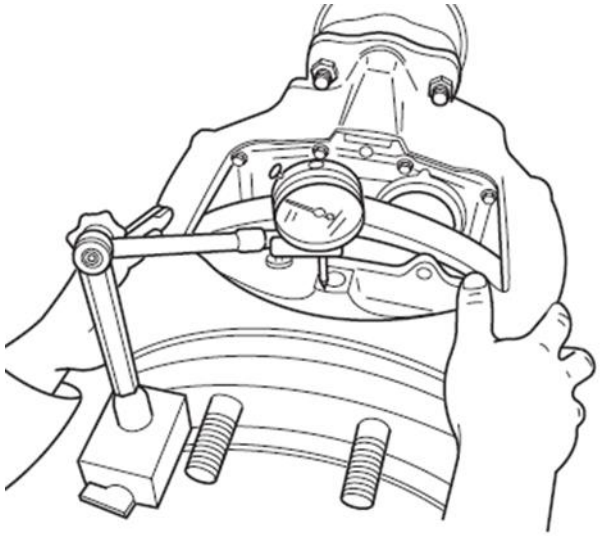


The caliper should slide freely by hand with the pads removed.

MERITOR
RUN WITH THE BULL

Wheels-Off Inspection
Radial End Play Check



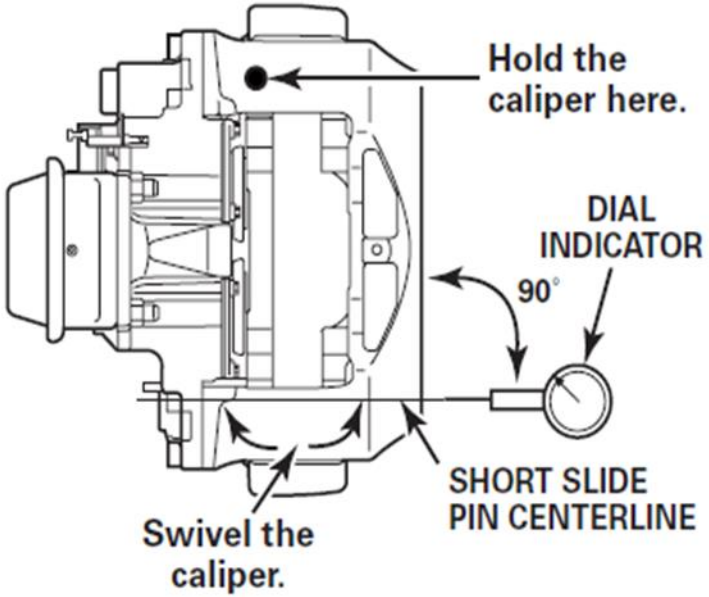


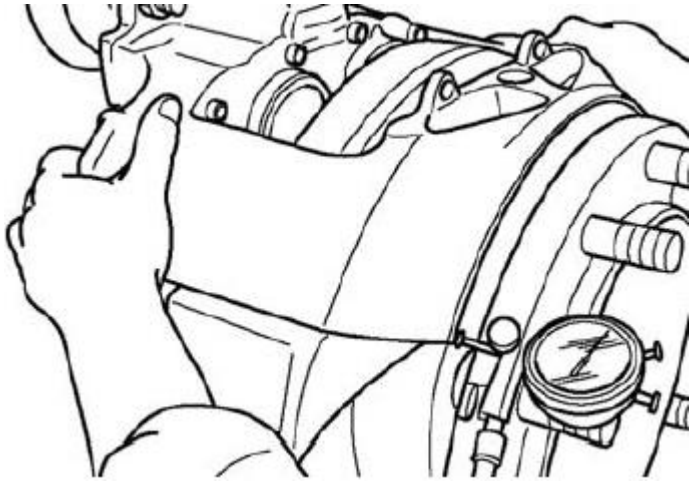
0.078” is the max allowed reading

Section 5 of MM-0467

MERITOR
RUN WITH THE BULL

Wheels-Off Inspection
Lateral End Play Check





0.118” is the max allowed reading

Section 5 of MM-0467

MERITOR
RUN WITH THE BULL

Wheels-Off Inspection

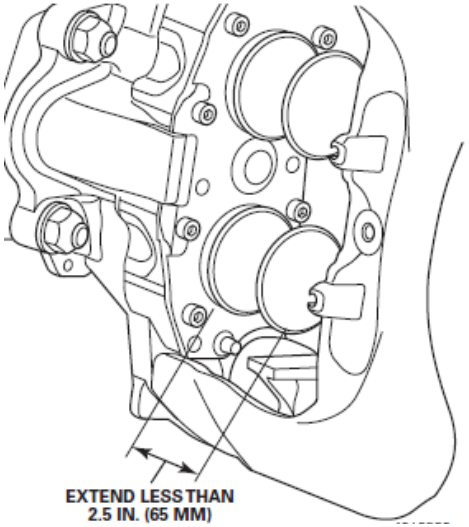
(Boot Inspection)

The piston and slide pin boots should be free of all damage and

~~OK~~

~~OK~~

OK

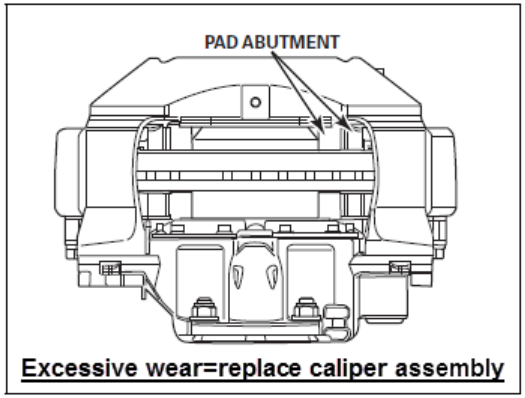


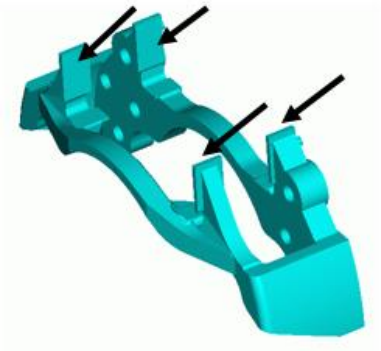
MERITOR
RUN WITH THE BULL

Meritor EX+ Model

Preventive Maintenance-Wheels Off

Pad Abutments



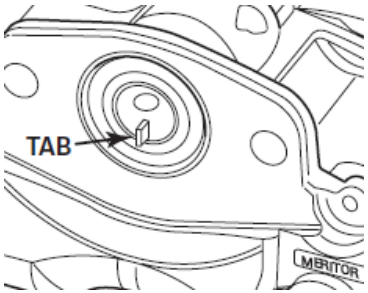


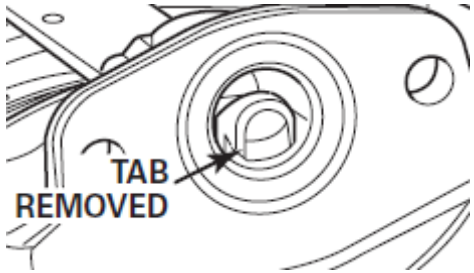
Maximum 0.079” wear depth (per TMC RP 652).

MERITOR
RUN WITH THE BULL

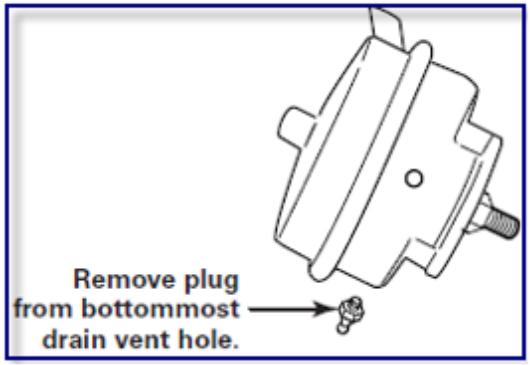
EX-225 Air Chamber

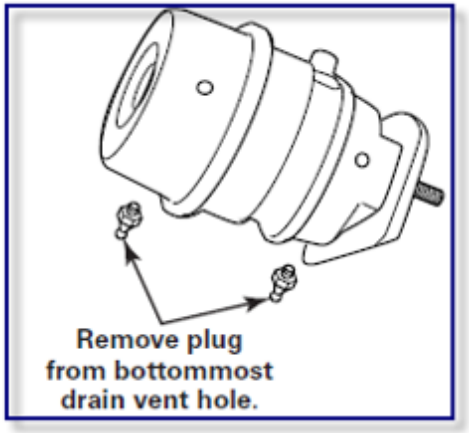
- When replacing a caliper, the transit plug must be removed prior to installing the air chamber.





- When drain plugs are present after chamber installation, remove whichever plug is at the lowest position.

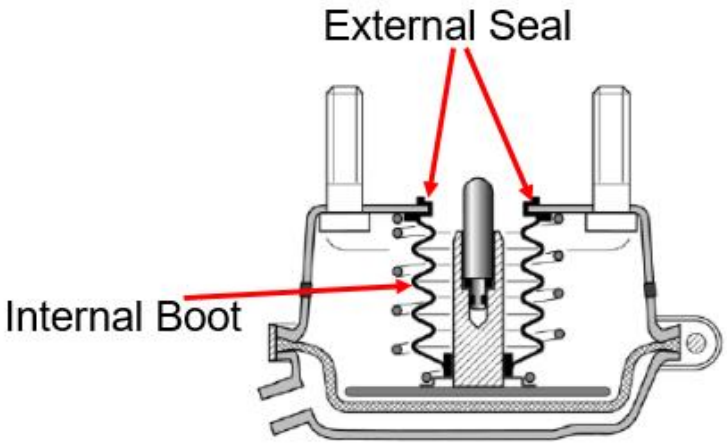




MERITOR
RUN WITH THE BULL

EX-225 Air Chamber

- **Disc brakes can be outfitted with service only or Service/Parking brake assemblies.**
- **Typical sizes are T-20 and T-24.**
- **Typically these are long stroke chambers.**
- **Direct mounted ADB chambers are fitted with ad caliper mounting area.**
- **Due to wheel end packaging often a special left c proper air hose routing.**



MERITOR
RUN WITH THE BULL

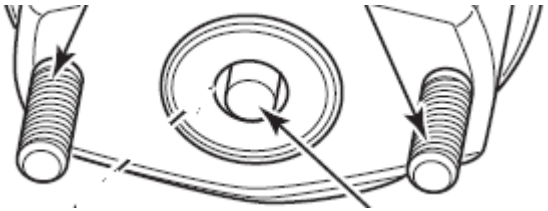
EX-225 Air Chamber

Service and Repair Tips

- Some air brake chambers are equipped with a loose pushrod tappet.

- When removing or installing the chamber make certain the tappet does not fall out and is installed upon re-installation of the chamber on the caliper.

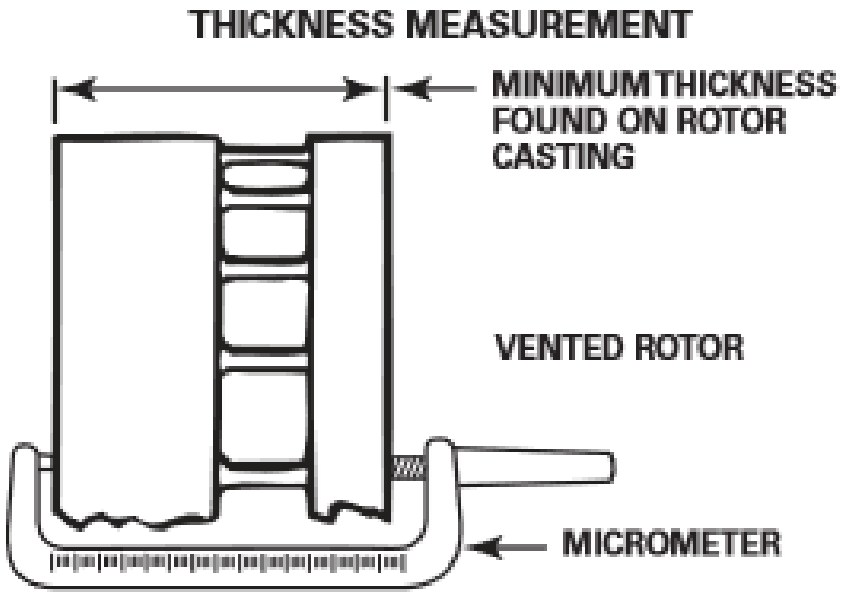
Tappet

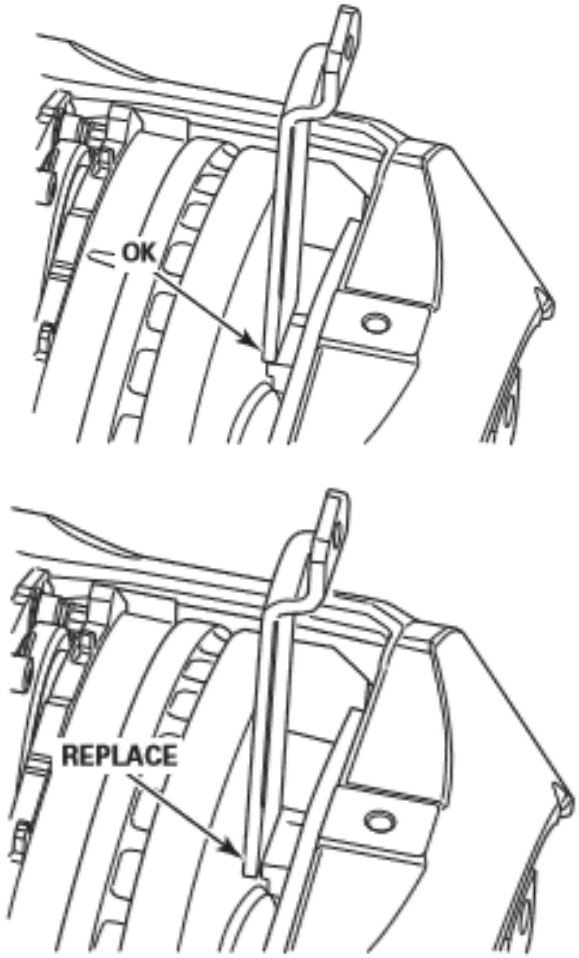


Pushrod less tappet

MERITOR
RUN WITH THE BULL

EX-225 Rotor Maintenance



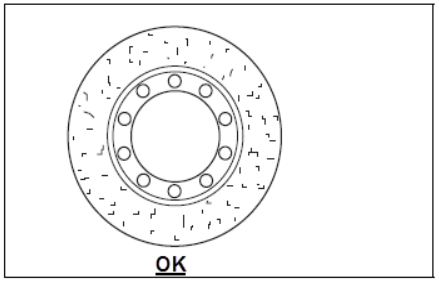


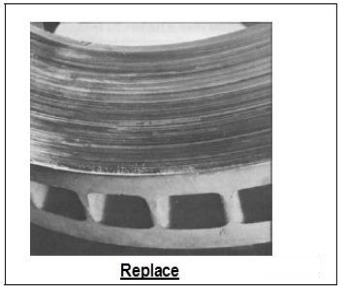
MERITOR
RUN WITH THE BULL

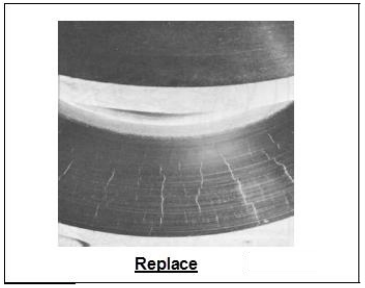
EX-225 Rotor Maintenance

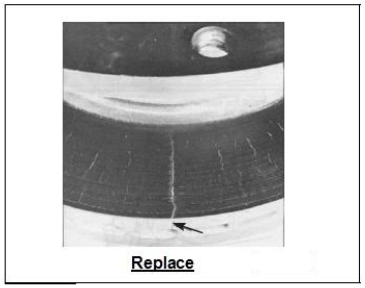
Preventive Maintenance-Wheels On

Rotor Inspection









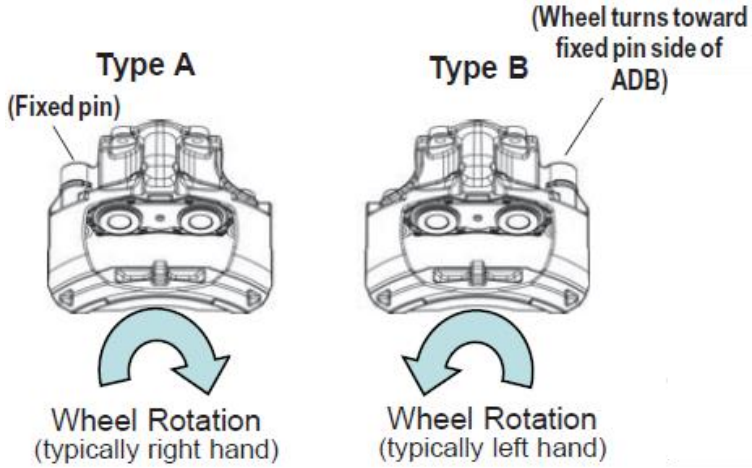
Replace or resurface rotor:

1. **Cracks= greater than=0.020”+75% of surface.**
2. **Cracks= extend through the rotor edge.**
3. **Scores= greater than 0.020”.**
4. **No heavy rusting.**

MERITOR
RUN WITH THE BULL

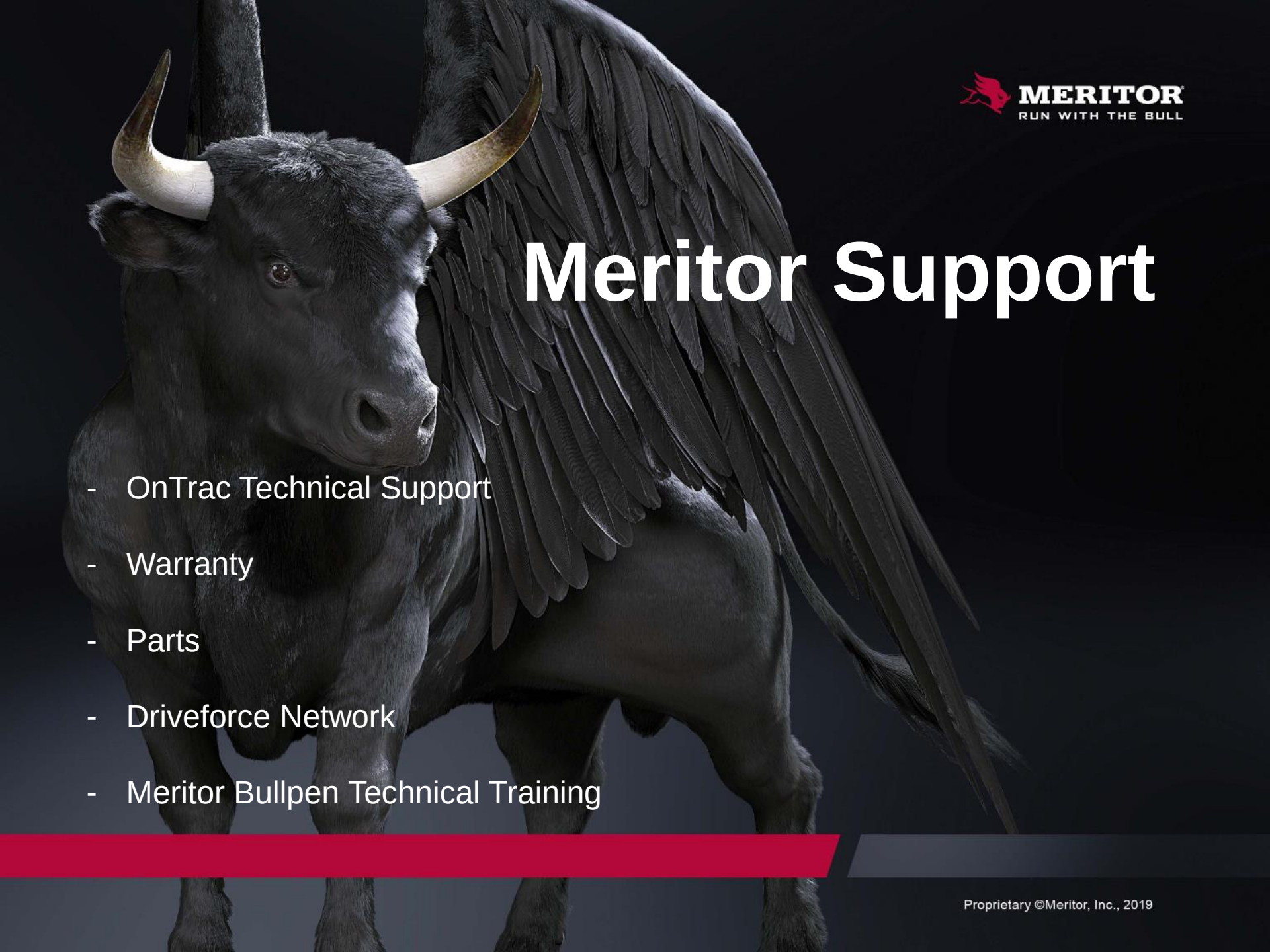
Meritor EX-225 Tech Tips

Caliper LH/RH Mounting Position



Leading slide pin = long **Trailing slide pin = short**

MERITOR
RUN WITH THE BULL

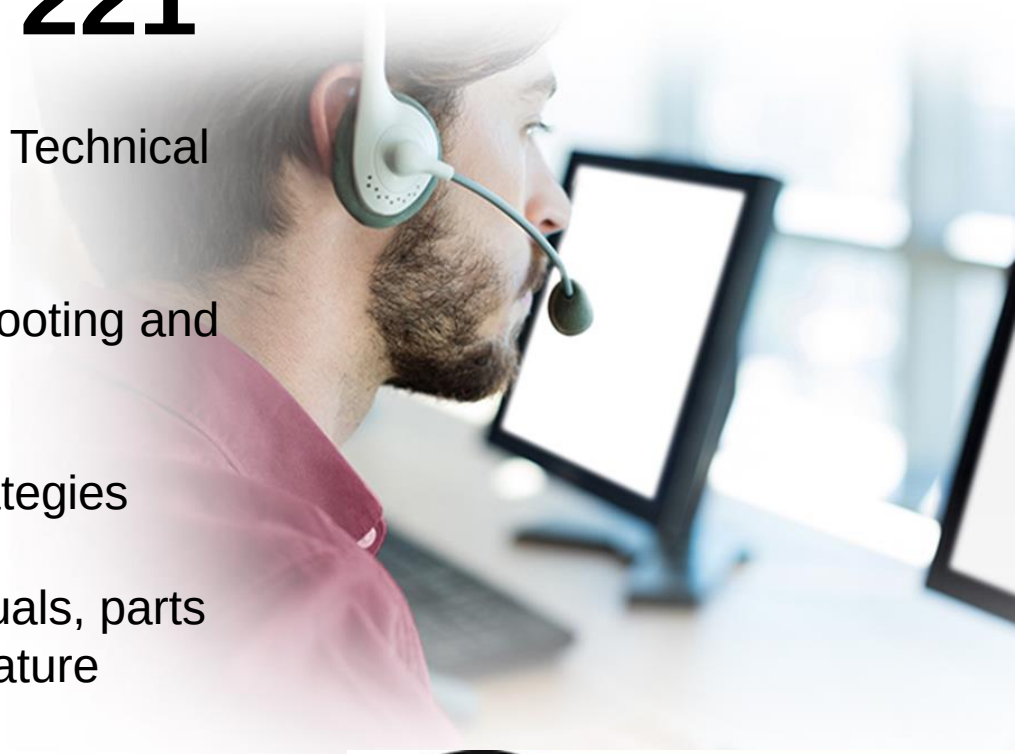


Meritor Support

- OnTrac Technical Support
- Warranty
- Parts
- Driveforce Network
- Meritor Bullpen Technical Training

Support – Technical Assistance / Warranty

1-866-668-7221

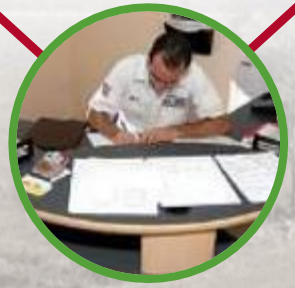


- OnTrac – Warranty and Technical Support
- Guidance on troubleshooting and diagnostics
- Guidance on repair strategies
- Providing service manuals, parts books, and service literature
- Validating warranty coverage

OnTrac
Meritor Customer Call Center

OnTrac's Warranty Process

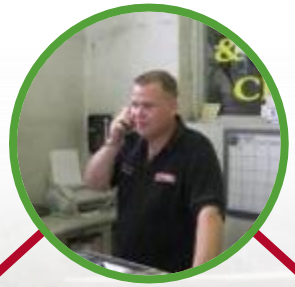
Broken component on truck or trailer



Technician gathers data and calls OnTrac

OnTrac agent opens claim and provides technical repair information

Technician performs necessary repairs



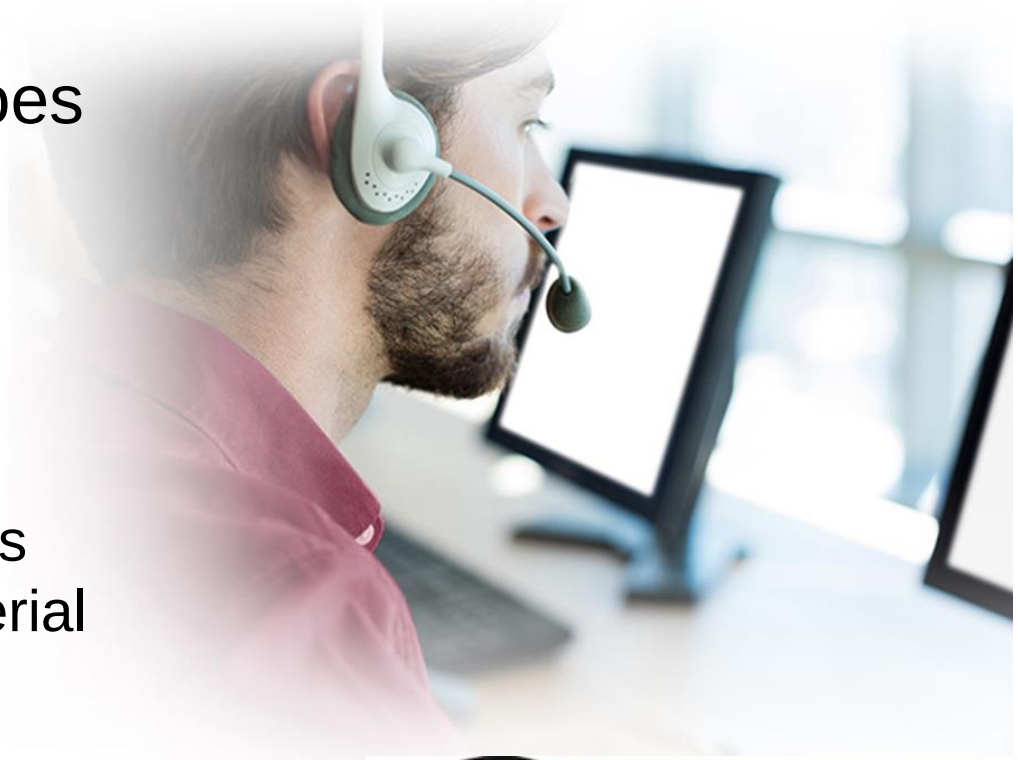
When repairs are complete technician calls OnTrac to close claim

Repair is complete and vehicle leaves the shop

MERITOR
RUN WITH THE BULL

Support – OnTrac Warranty

- What information does OnTrac need?
  - Meritor Dealer ID
  - Vehicle VIN
  - Time in service
  - Vehicle mileage/hours
  - Component model/serial number



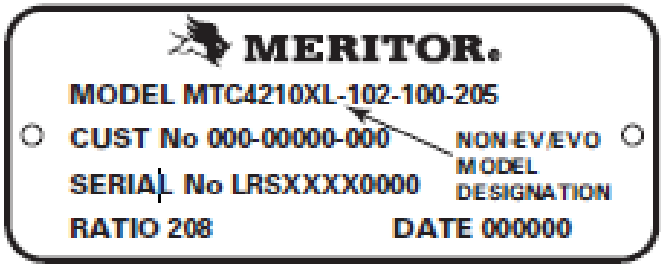
OnTrac
Meritor Customer Call Center

Support – Parts / Part Numbers

1-888-725-9355

- Op. 2 (Order Pricing/Availability)
- - Op. 3 (Specifications)

- Model/serial number located on ID tag of component.
- Description of what part you will need.



MERITOR PARTS XPRESS

MERITOR
RUN WITH THE BULL

The DriveForce Focus

New Truck Components

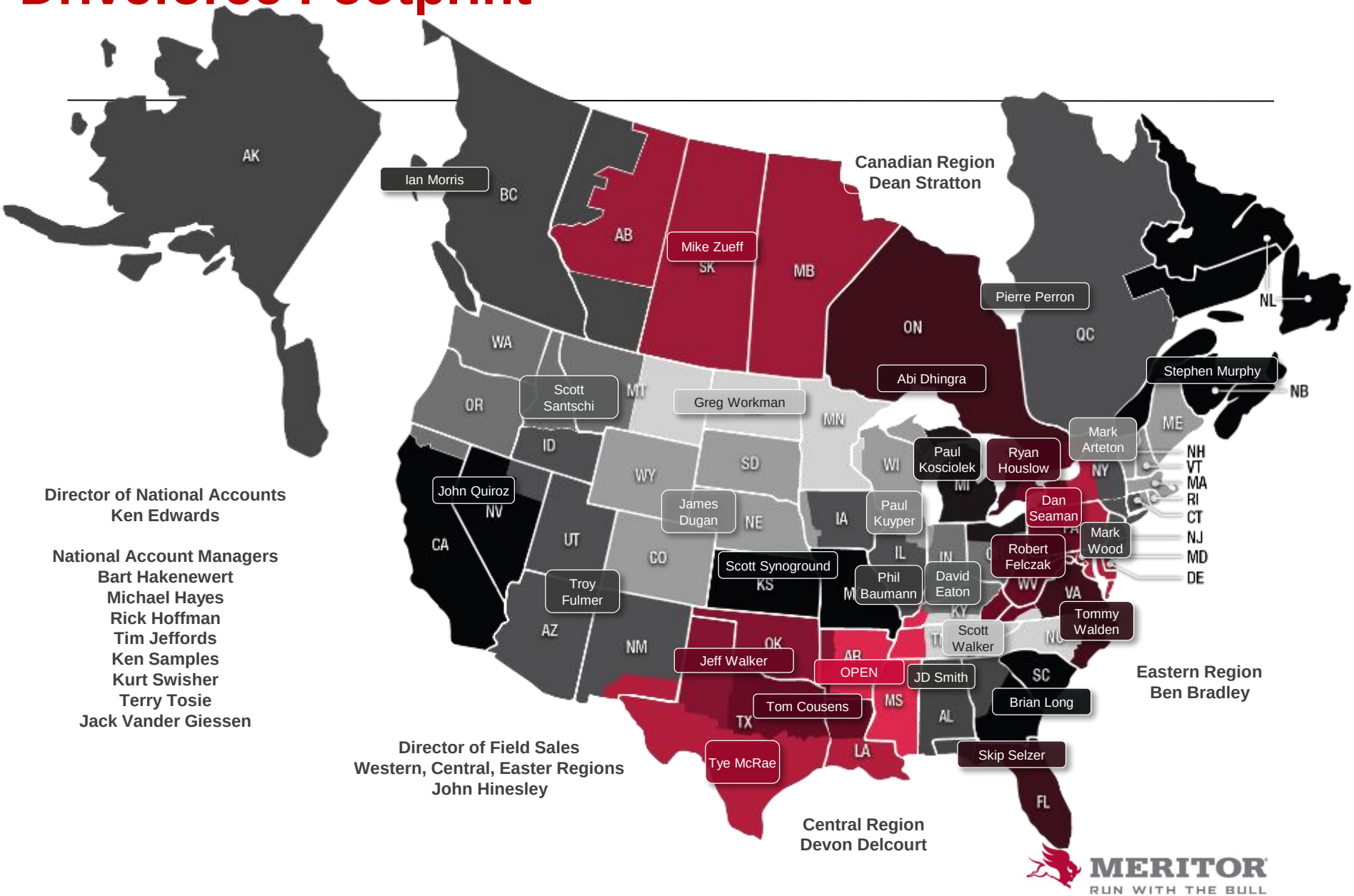
MERITOR
RUN WITH THE BULL

Support - DriveForce

110+ Dedicated DriveForce Sales and Service Representatives Across The United States And Canada Focused On Our End Customers: Fleets/Dealers

Canadian Region | Eastern Region | Central Region | Western Region

Driveforce Footprint



Canadian Region
Dean Stratton

Director of National Accounts
Ken Edwards

National Account Managers
Bart Hakenewert
Michael Hayes
Rick Hoffman
Tim Jeffords
Ken Samples
Kurt Swisher
Terry Tosie
Jack Vander Giessen

Director of Field Sales
Western, Central, Easter Regions
John Hinesley

Eastern Region
Ben Bradley

Central Region
Devon Delcourt

MERITOR
RUN WITH THE BULL

The DriveForce Focus

Aftermarket Parts

Brake & Wheel End

Wheel End

- Brake Shoes/Kits
- Hubs/Drums
- Wheel Seals
- Bearings
- Camshafts
- Wheel Bearing Adjustment System
- Automatic & Manual Slack Adjusters
- Wheel Attaching Components

Disc Brake (Hydraulic and Air)

- Calipers
- Rotors
- Wheel Cylinders
- Brake Hardware
- Disc Pads

Air System

- Compressors
- Air Dryers
- ECUs
- Valves
- Cartridges
- Sensors

Drivetrain

Driveline

- Universal Joints
- Center Bearings
- Tubing
- Yokes
- Flanges
- Spline Plugs
- Bearing Stub Shafts
- Yoke Shafts

Drive Axle

- Axles
- Differentials
- Gear Sets
- Gearing
- Seals and Bearings
- Overhaul Kits
- Axle Shafts

Clutch

- 14" Assemblies
- 15.5" Assemblies
- Clutch Brakes
- Installation Kits
- Other Accessories

Transmission

- Transmissions
- Gearing
- Seal and Bearing Kits
- Overhaul Kits
- Input Shafts

Steering & Suspension

Steering

- FastSet™ No-Ream King Pin Kits
- ReadySet™ No-Ream King Pin Kits
- Ream King Pin Kits
- Tie Rod End
- Drag Links
- Cross Tubes
- Steering Arms

Suspension and Trailer

- Air Springs
- U-Bolts and Threaded Rods
- Equalizers
- Hanger Brackets and Hardware
- Hangers
- Bushings
- Torque Rods
- Shock Absorbers
- Trailer Axles
- Meritor MTA Series Suspension Systems
- MTIS and Components

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Training – Meritor BullPen Overview

WHAT IS THE BULLPEN?

The Meritor BullPen is a convenient web portal designed for dealers, fleets, service garages and alike to access Meritor's product information and training in one central location.

- Axles
- Brakes
- Drivelines
- Trailer
- ABS Training
- Online Training
- Instructor Led Training
- Meritor on the Move
- Literature on Demand
- Updates
- Quick Links
- News & Events
- Training Progress

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Training – Meritor BullPen Access

- Access the BullPen
  - MeritorBullPen.com
  - From links posted on Meritor.com
  - From email signatures
  - Through Meritor *Mobile*
  - From promotional material

Access

- MeritorBullPen.com
- Links posted on meritor.com
- Email signatures
- Through Meritor *Mobile*
- From promotional material
- MERITOR DRIVEFORCE™

MERITOR
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Instructor-Led Training Schedule

- In-depth, hands-on training from industry experts
- Sessions are conducted at Meritor's Headquarters in Troy, Michigan
- For more information and to register, visit MeritorBullpen.com

January 15th - 16th
Brakes, Cam & Disc

February 20th - 21st
Steer Axles and Drive Axles

March 19th - 21st
T-Case & Drive Steer Axles

April 9th - 10th
Trailer Suspensions

May 7th - 8th
Brakes, Cam & Disc

July 23rd - 24th
Steer Axles and Drive Axles

August 13th - 15th
T-Case & Drive Steer Axles

September 24th - 25th
Driveline, NVH, Failure Analysis

October 22nd - 23rd
Brakes, Cam & Disc

RUN WITH THE BULL | MERITOR

Web Based Interactive Training Schedule

- Live monthly seminars and product updates brought right to your device
- Second Wednesday of every month 11 A.M. EST
- For more information and to register, visit MeritorPartsXpress.com

January
Driveline

February
Steer Axle King Pins

March
Reduced Stopping Distance

April
Cam Brake Diagnosis

May
Air Disc Brake (ADB)

June
Suspensions

July
Air Systems

August
Hydraulic Brake

September
Slack Adjusters

October
Drive Axle

November
Wheel End

December
Air Disc Brake (ADB)

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