NHVIM – Section 2

BASIC BRAKES MAINTENANCE
Chair – Lance Fisher, JLP

Panel Members
- Andrew Archibald, TMR Queensland
- Renzo Barone, Meritor
- Kevin Gibson, Knorr-Bremse
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Top 3 Defects

11,496 = 31% Lights and Electrical

11,850 = 32% Steering and Suspension

13,551 = 36% Service Brakes
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- Renzo Barone, Meritor
- Kevin Gibson, Knorr-Bremse/Bendix
Meritor Q Plus™ Brake

- Lining profile designed to deliver even wear to end of life
- New Meritor Approved (MA) friction materials for vehicles required to meet reduced stopping distances
- Heavy-duty return spring for maximum durability
- Proven dual anchor pin design
- Long life camshaft bushing materials; available with standard, heavy-duty, or bronze cam bushings
- Precision optimized S-Cam profile to achieve consistent brake torque output throughout the lining life
- Quick change shoes for ease of service
- Availability of lightweight stamped steel spiders for front and rear applications
- Best-in-class brake shoe E-Coating; also available with optional Platinum Shield premium coating
BY DESIGN, THE ANCHOR END WILL BE AT 0.047” CLEARANCE AND THE CAM END WILL BE AT 0.034” CLEARANCE.
The Meritor Q-plus shoe is designed to contact at the center of the shoe at new lining condition. This designed “crown” is necessary to control brake torque. Due to tolerance stack ups the crown is designed to contact the drum first. This condition will exist until the linings wear to the drum inside diameter over several brake applications. This is often called “bedding”, “burnishing” or “green lining condition”. Once the bedding is complete, a full contact of lining to drum will exist. Without the crown the brake torque output will vary depending on the point of contact. Varying initial contact may cause an instability of the vehicle.
• Measure lining thickness.
• Minimum thickness is ¼” (6.3 mm)
• 1/16” (2 mm) over rivets.

Reline the Brakes

Reline the brakes when the lining thickness is 0.25-inch (6.3 mm) at the thinnest point. The rivets or bolts must not touch the drum. Damage to components will result. Meritor recommends that you replace the springs, rollers, camshaft bushings and anchor pins at each reline. Reline the brakes when the lining thickness is 0.25-inch (6.3 mm) at the thinnest point. Replace shoe retainer springs, check the drum, and perform a major inspection when you reline the brakes.
Check the up-and-down and side-to-side end play of the camshaft to determine if you must replace the camshaft bushings.

If the total movement is more than 0.030 inch (0.76 mm), replace the bushings.

If axial end play exceeds 0.060 inch (1.52mm) remove snap ring & add an appropriate number of spacing washers between the slack adjuster & snap ring. Correct specification 0.005 – 0.060inch (0.127 – 1.52mm)
STEER BRAKE RETURN SPRING
Brake system component facts

Brake force imbalance will result in premature lining and drum wear from the brakes being over-worked.

Brake imbalance can be defined as each brake in a vehicle or a combination vehicle not doing its equal share of the braking.

Brake imbalance can be caused by: pneumatic imbalance, well-adjusted and poorly-adjusted brakes, incorrect lining mix for the application, using the trailer brakes to stop the combination vehicle, worn foundation components, etc.
According to the CVSA, a defective brake, (out-of-service) is defined as one or more of the following conditions:

- Lining cracks or voids over 1/16” (2 mm) in width observable at the lining edge.
- Cracks that exceed 1.5” (38 mm) in length.
- Missing portions of a lining segment such that a fastener is exposed when viewed from the lining edge.
- Cracks extending across the lining face through the lining edges.
- Loose lining segments.
- Complete lining segment missing.
OUT-OF-SERVICE CRITERIA

- Out of service portion of lining missing that exposes a fastening device.
- Cracks across the lining face that extend through the lining edges.
- Cracks or voids that exceed 1/16" in width.
- Cracks that exceed 1-1/2" in length.
Effect: Chunks out of lining. Fuzzy effect on lining surface.

Probable Cause: Overworked lining. Excessive Heat
Effect: Lining worn on one side more than the other.

Probable Cause: Bell-Mouthed Drum
ADDITIONAL BRAKE BLOCK WEAR PATTERNS & CAUSES

Effect: Excessive Lining Wear in Middle

Probable Cause: Grooved Drum

[Image of brake block]
DRUM HOT SPOTTING (BLACK SPOTS)

- Over the entire drum surface, replace the brake drum.
- On one side only, replace the brake drum.
- In equally distant places, replace the brake drum.
Cracks that are 1” (25 mm) or more long are usually deep and require that you replace the brake drum.
ADJUSTING DRUM BRAKES

MANUAL SLACK ADJUSTERS

Raise wheel off the ground and support axle.

⚠️ Chock wheels on another axle to prevent vehicle moving when raised.

Push down lock on adjusting nut.

Turn the adjusting nut until the brake linings touch the drum.

Turn the adjusting nut in opposite direction for one or two clicks so that linings just clear the drum.

Rotate the drum to check for clearance.

Brake MUST NOT drag.

NOTE
Lock ring must be engaged after adjustment.
ADJUSTING DRUM BRAKES

AUTO SLACK ADJUSTERS

Raise wheel off the ground and support axle.

⚠️ Chock wheels on another axle to prevent vehicle moving when raised.

Disengage or remove the pawl as required.
Turn the adjusting nut until the linings touch the drum, then turn the adjusting nut ½ a turn in the opposite direction.

Rotate the drum to check for clearance.
Brake **MUST NOT** drag.
If the brake chamber has been replaced or slack adjuster clevis removed, the clevis position on the chamber rush rod must be set.
“free stroke” is between 5/8” - 3/4” (15.9 - 19.1mm)

Free stroke = \( Y \) minus \( X \)

DRUM brake free stroke must be 5/8” - 3/4”
(15.9 mm - 19.1 mm)

DISC brake free stroke must be 3/4” - 7/8”
(19.1 mm - 22.2 mm)
BRAKE ADJUSTMENT INSPECTION

MEASURE

Spring Brakes Released
Service Brakes Not Applied

(100 PSI in Air Tank — Engine Off)

Spring Brakes Released
Service Brakes Not Applied
BRAKE ADJUSTMENT INSPECTION

Maximum stroke at which brake must be adjusted*. 80-90 PSI (550-620 kPa) air pressure in the air chamber. Clamp type air chamber.

<table>
<thead>
<tr>
<th>Chamber Type (Size)</th>
<th>Stroke Length Not to exceed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1-3/8 inches (34.9 mm)</td>
</tr>
<tr>
<td>12</td>
<td>1-3/8 inches (34.9 mm)</td>
</tr>
<tr>
<td>16</td>
<td>1-3/4 inches (44.4 mm)</td>
</tr>
<tr>
<td>20</td>
<td>1-3/4 inches (44.4 mm)</td>
</tr>
<tr>
<td>24</td>
<td>1-3/4 inches (44.4 mm)</td>
</tr>
<tr>
<td>30</td>
<td>2 inches (50.8 mm)</td>
</tr>
<tr>
<td>36</td>
<td>2-1/4 inches (57.1 mm)</td>
</tr>
</tbody>
</table>

*NOTE: The U.S. Department of Transportation (DOT), Federal Highway Administration has issued the above specifications for cam brakes.
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Kevin Gibson

Knorr-Bremse

*Air Disc Brakes - Basic Maintenance*
Serviceable Components - Air Disc Brakes
Brake Pads - Functional & Visual Checks

New Brake Pads

Outboard Brake Pad
9mm 30mm

Inboard Brake Pad
B C

Outboard Brake Pad
2mm 11mm

Worn Brake Pads
Brake pads must be replaced as an axle set

Inboard Brake Pad
C D

Brake Pad with minor damage (permitted)

Possible causes (Failure Modes),
- Incorrect adjustment
- Faulty Adjuster
- Performance (damaged components)
- System issues (leaking chambers)
- Pad Spring damage & fatigue
- Foreign material (rocks & road junk)
- Harsh & Abusive braking
- Non-genuine Pads
- Mixed Pad Brands
- Bearing run-out
Checking the GAP between Tappets & Pad (0.6 - 1.1mm)
If the gap difference between the two tappets is > 0.25 mm then the caliper bearing clearance must be checked.

If the GAP between Tappets & Pad is > 1.1mm the Adjuster must be checked using Manufacture procedure.
Brake Pad/Disc Wear Check (on vehicle)

NEW Brake Pads & Disc Indicator position example.

WORN Brake Pads & Disc Indicator position example.

Caliper Movement & Running Clearance

Check for axial movement when brakes are in released position.

Measuring Guide Pin Bearing Clearance (max. 1mm).
Brake Discs (Rotors) - Functional & Visual Checks

Disc surface condition checks:
A: Network-type tears = permissible
B: Radial cracks up to max. 1.5 mm width and depth = permissible
C: Uneven disc surface less than 1.5 mm = permissible
D: Continuous cracks = not permissible

Technical details:
• When thickness is ≤ 39 mm, renewed when the brake pads are changed.

In the case of surface conditions A - C, the brake disc can be used until the minimum permissible disc thickness has been reached.

IMPORTANT!
To prevent damage to the brake discs, the brake pads should be replaced when their thickness (excluding backing plate) is 2 mm or less.
Pad thickness < 2mm
Tappet & Boot - Checking

If Gap difference between the two tappets is > 0.25 mm check caliper bearing clearance.

Tappet Boots must not have any cuts/tears/damage will lead to corrosion and impair the function of the clamping mechanism and wear adjuster.

Brake Actuators (Spring Brakes, Brake Chambers)

Matching OE Brake Actuators
• Damage
• Leaks
• Loose fasteners – Secure
• Loose Clamp hoops
• Drain Plugs
• Port Damage – cracks, cross thread
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Questions