Motion Control® Trucks

100/110 Ton Capacity

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INTRODUCTION

Proper functioning of the Motion Control (MC) truck is dependent on the satisfactory condition of the control elements providing sufficient column load for energy dissipation. Although the life expectancy of these components cannot be predicted in terms of years due to the many service variables involved, they function as friction snubbers so some wear is inherent in their action.

Typical wear of the control elements occur on:
1) the column wear plate,
2) the Super Service Ridemaster (SSRM) friction shoe face,
3) the SSRM friction shoe slope surface, and
4) the bolster slope surface. These elements are shown in the figure at the right. Such wear causes the friction shoe to rise within the bolster friction shoe pocket. As the friction shoe rises, the control coil decompresses causing a reduction in column load. Therefore, MEASUREMENT OF FRICTION SHOE HEIGHT IS A COMPREHENSIVE MEASURE OF TOTAL CONTROL ELEMENT WEAR.¹

Several methods are available for determining the friction shoe height. The most accurate method is to use a Shoe Height Yoke Gauge (MC 7), or a Shoe Height Measurement Gauge (MC 8). Both drawings are fully dimensioned for manufacture and contain instructions for use (MC 9). NOTE: FRICTION SHOE HEIGHT IS INDEPENDENT OF CAR LOAD CONDITION.

All Motion Control trucks are produced with a cast-in Visual Shoe Height Indicator that is also capable of measuring total wear independent of car load. See MC 5 for instructions regarding proper use of these visual indicators.

In addition to these methods, the friction shoe also has a cast-in visual indicator to determine when the friction shoe should be replaced based on face wear.

¹Reduction in column load can also result from a decrease in coil capacity due to the coils taking a permanent set. Control coil free height should be checked as shown in instructions on MC29.
DETERMINING IF REPAIRS ARE NEEDED

Visual Shoe Height Indicators

Notes:

For friction shoes produced by a manufacturer other than ASF-Keystone, Inc., see manufacturer’s recommended procedures for inspection and repair.

If bolster is off center, average out position of both Visual Shoe Height Indicators.

Allowable shoe rise for all MC trucks is 1.0”. If it is not possible to determine allowable rise with Visual Shoe Height Indicators, use Shoe Height Yoke Gauge (MC 7) or Shoe Height Measurement Gauge (MC 8).

NO MAINTENANCE IS REQUIRED – when bottom edge of visual shoe height indicator is below top of bolster.

CONTROL REMAINS BUT REPAIR IS INDICATED – when bottom edge of visual shoe height indicator is aligned with top of bolster.

REPAIR IS INDICATED – when bottom edge of visual shoe height indicator is above top of bolster.
DETERMINING IF REPAIRS ARE NEEDED (CONT.)

Visual Shoe Face Wear Indicators

Notes:

For friction shoes produced by a manufacturer other than ASF-Keystone, Inc., see manufacturer’s recommended procedures for inspection and repair.

Allowable shoe face wear for all MC trucks is 0.375”.

Important:
If any friction shoe is replaced due to wear, opposite friction shoe in that bolster end must also be replaced.
DETERMINING IF REPAIRS ARE NEEDED (CONT.)

Shoe Height Yoke Gauge

**Inspection:**
1. For friction shoes produced by a manufacturer other than ASF-Keystone, Inc., see manufacturer’s recommended procedures for inspection and repair.
2. Gauge should be used for all MC trucks regardless of manufacture date.
3. Apply gauge such that points “Y” and “Z” are located at center of friction shoes as indicated.

**Gauge criteria:**
- **NO MAINTENANCE IS REQUIRED** – when gauge contacts top of bolster at “X” and does not contact both friction shoes at “Y” and “Z”.
- **CONTROL REMAINS BUT REPAIR IS INDICATED** – when gauge contacts top of bolster at “X” and **both** friction shoes at “Y” and “Z”.
- **REPAIR IS INDICATED** – when gauge contacts both friction shoes at “Y” and “Z” and does **not** contact top of bolster at “X”.

For gauge construction details, see MC 9.
DETERMINING IF REPAIRS ARE NEEDED (CONT.)

Shoe Height Measurement Gauge

**Inspection:**
1. For friction shoes produced by a manufacturer other than ASF-Keystone, Inc., see manufacturer’s recommended procedures for inspection and repair.
2. Gauge should be used for all MC trucks regardless of manufacture date.
3. Apply gauge such that points “Y” and “Z” contact both friction shoes as indicated.
4. Slide scale down until it contacts top of bolster.

**Gauge criteria:**
- Dimension “A” = distance from gauge surface “X” to top of bolster.
- **NOMINAL NEW** – when dimension “A” equals 0.25”.
- **NO MAINTENANCE IS REQUIRED** – when dimension “A” is less than 1.25”.
- **CONTROL REMAINS BUT REPAIR IS INDICATED** – when dimension “A” equals 1.25”.
- **REPAIR IS INDICATED** – when dimension “A” is greater than 1.25”.

For gauge construction details, see MC 9.
DETERMINING IF REPAIRS ARE NEEDED (CONT.)

Shoe Height Yoke and Measurement Gauge Construction Plans

SURFACES MARKED ** ARE GAUGING SURFACES AND NEED TO BE MACHINED.
SURFACES "Y" AND "Z" ARE TO BE CO-PLANER AND PARALLEL TO SURFACE "X".
MATERIAL: STEEL OR, 7075-T6 OR 7079-T6 ALUMINUM

GAUGE CONSTRUCTION TOLERANCES UNLESS OTHERWISE SPECIFIED

3 PLACE DECIMALS ± .004
2 PLACE DECIMALS ± .03
1 & 0 PLACE DECIMALS ± .12

ANGLES IN:
DEGREES, MINUTES ± 5°
DEGREES ONLY ± 1°

SURFACES MARKED ** ARE GAUGING SURFACES AND NEED TO BE MACHINED.
MATERIAL: STEEL OR, 7075-T6 OR 7079-T6 ALUMINUM

GAUGE CONSTRUCTION TOLERANCES UNLESS OTHERWISE SPECIFIED

3 PLACE DECIMALS ± .004
2 PLACE DECIMALS ± .03
1 & 0 PLACE DECIMALS ± .12

ANGLES IN:
DEGREES, MINUTES ± 5°
DEGREES ONLY ± 1°
**DISASSEMBLY / ASSEMBLY PROCEDURE**

**Notes:**

1. All load coils and control coils may be removed by raising the bolster within the side frame.

2. Bolster must be removed from side frame in order to perform maintenance on any of the following components:
   a. Side frame
   b. Bolster
   c. Friction Shoes
   d. Column Wear Plates

3. Reverse above procedure for assembly of Motion Control Truck Control Elements. Lubricate bolster shoe pockets prior to assembly (MC 11).

**WARNING**

If bolster is rotated a sufficient amount (approximately 53°) heavy friction shoes can drop out of bolster friction shoe pockets and can cause injury if struck by one.
LUBRICATION PROCEDURE

Application:
1. If polymer backed friction shoes are used, lubricate per manufacturer’s recommendations.
2. Apply one light coat of lubricant to the following surfaces when the friction shoes are reinserted into the bolster:
   a. Slope surfaces, "X", of the pocket.
   b. Outside vertical pocket walls, “Y”.
3. Use caution to avoid lubricant spread to other surfaces.

Notes:
1. Recommended Lubricant
   Dow Corning Molykote BR-2 Plus
   Dow Corning Corporation
   Midland, Michigan 48640

2. Alternate Lubricant
   Lubriplate – Gear Shield Extra Heavy (part no. 15263)
   Extreme Pressure Lubricant
   Fiske Brothers Refining Company
   Toledo, Ohio 43605

3. Alternate Lubricant
   Lubriplate – Gear Shield Extra Heavy
   Part No. L0152-035
   Fiske Brothers Refining Company
   Toledo, Ohio 43605

Important: Do not apply lubricant to friction shoe face and side frame column wear plate. Care must be taken to prevent lubricant from spreading to these surfaces.
RECOMMENDED INSPECTION AND REPAIR PROCEDURES

General Information:

1. This Maintenance and Repair Manual covers the maintenance and repair of the proprietary features of the Motion Control truck design. For repair of non-proprietary features, refer to AAR M-214, “Classification and Repair Procedures for Used and Reconditioned AAR Approved Side Frames and Bolsters Applicable to Interchange Service”.

2. Should any of the following elements require replacement, its companion element at the same bolster end also needs to be replaced:
   a. Friction Shoes
   b. Column Wear Plates
   c. Control Coils

3. If load springs are to be replaced, it is recommended that new and used springs not be mixed within the same spring group.

4. Weld rod and heat treatment requirements are as follows, unless otherwise noted:
   a. Recommended AWS/ASTM class weld consumable as follows:
      i. Grade B castings: E7015, E7016, E7018, E8015, E8016, E8018 or equivalent
      ii. Grade B+ castings: E8015, E8016, E8018 or equivalent
      iii. Grade C castings: E9015, E9016, E9018, E10015, E10016, E10018 or equivalent
   b. Welding is not allowed when the surfaces to be welded are wet or exposed to rain, snow, high wind or when the ambient temperature in the immediate vicinity is below 0°F.
   c. Grade B or B+ castings shall not be welded upon while the temperature of the casting is below 40°F. Localized preheating is acceptable so long as the effected area is uniformly preheated and remains above 40°F while welding is being performed.
   d. Grade C castings shall be preheated to a temperature between 300°F and 600°F. Localized preheating is acceptable so long as the effected area is uniformly preheated and remains above 300°F while welding is being performed.
   e. For repair of elements covered by this manual, post weld heat treatment is not required. (See AAR Standard M-210, latest revision, for details.)

5. Weld procedures are as follows unless otherwise noted:
   a. Casting should be positioned for down hand welding.
   b. Welding must be performed in a workmanlike manner.
   c. Welds need to be homogeneous and free of gas and foreign inclusions.
   d. Weld repaired surfaces, if ground, should conform to SCRATA level H-5 for mechanical dressings except where noted.
**Recommended Inspection and Repair Procedures (cont.)**

**Bolster Pocket Side Walls**

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**Inspection:**
1. From an unworn surface (near bottom of pocket), determine amount of wear.
2. Any bolster pocket side wall with 0.125" or more of wear, perform repairs.

**Repair and Post Repair Inspection:**
1. Build up surface using puddle weld method and grind to unworn surface.
2. Repeat inspection and if necessary repeat repair. Check with gauge 1-9202 (MC 19) and 1-9205 (MC 20).
RECOMMENDED INSPECTION AND REPAIR PROCEDURES (CONT.)

Bolster Outer Land Surfaces

**Inspection:**
1. Remove any fins or protrusions that have formed due to wear before inspecting outer land surfaces using Outer Land Surface gauge.
2. Gauge must pass over outer land surface from outer gib to inside edge of outer land surface with gauge surface designated “X” in contact with top of bolster and a “Y” surface in contact with an outer land surface.
3. If a 0.281” thick by 0.50” wide feeler can be inserted anywhere between other “Y” surface and outer land surface, repair both outer land surfaces.

**Repair and Post Repair Inspection:**
1. Build up outer land surfaces using puddle weld method and grind.
2. After repairs, place gauge such that scribe line is on bolster centerline.
3. Check repairs by trying to place a 0.141” thick by 0.50” wide feeler anywhere between either outer land surface and a “Y” surface.
4. If this feeler can be placed, repeat repair.

**Gauge Construction Tolerances**
- Unless otherwise specified:
  - 3 place decimals ± .004
  - 2 place decimals ± .03
  - 1 & 0 place decimals ± .12
  - Angles in:
    - Degrees, minutes ± .5°
    - Degrees only ± 1°

**A.A.R. STANDARD M-214 ACCEPTANCE**
- Distance across outer lands + .125, - .0625
- A.A.R. REF.: EC-1150

**Material:** 0.25” steel plate

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1.9206
RECOMMENDED INSPECTION AND REPAIR PROCEDURES (CONT.)

Bolster Inner Land Surfaces

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**Inspection:**

1. Remove any fins or protrusions that have formed due to wear before inspecting inner land surfaces using Inner Land Surface gauge.

2. Gauge must pass over inner land surface from inner gib to inside edge of inner land surface with gauge surface designated “X” in contact with top of bolster and a “Y” surface in contact with an inner land surface.

3. If a 0.281” thick by 0.50” wide feeler can be inserted anywhere between other “Y” surface and inner land surface, repair both inner land surfaces.

---

**Repair and Post Repair Inspection:**

1. Build up inner land surfaces using puddle weld method and grind.

2. After repairs, place gauge such that scribe line is on bolster centerline.

3. Check repairs by trying to place a 0.141” thick by 0.50” wide feeler anywhere between either inner land surfaces and a “Y” surface.

4. If this feeler can be placed, repeat repair.

---

**Gauge Construction Tolerances (unless otherwise specified):**

- 3 PLACE DECIMALS ± .004
- 2 PLACE DECIMALS ± .03
- 1 & 0 PLACE DECIMALS ± .12

**Angles in:**

- DEGREES, MINUTES ± .5º
- DEGREES ONLY ± 1º

**A.A.R. Standard M-214 Acceptance:**

DISTANCE ACROSS INNER LANDS + .125, - .0625

A.A.R. REF.: EC-1150

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END OF BOLSTER SHOWING PROPER INNER LAND SURFACE GAUGE PLACEMENT
**Recommended Inspection and Repair Procedures (cont.)**

Confirming Bolster Outer/Inner Land Surfaces Repairs

**Inspection:**
1. It is recommended that land surface repairs be confirmed with the Column GO and NO-GO gauge.
2. Remove any fins or protrusions that have formed due to wear.
3. Position the gauge as shown in the application view below.
4. Apply gauge to top and bottom of bolster.
5. Surfaces “A” and “B” must go full depth of land surfaces and gibs.

**Inspection (cont.):**
6. Surfaces “C” and “D” must not go over any land surfaces.
7. Repeat for all bolster ends.
8. If any land surface fails this check, repeat repair procedures discussed on MC 14 and MC 15.
9. Check with appropriate land surface gauge and confirmed with Column GO and NO-GO gauge.
10. Repeat procedure until land surfaces pass inspection.

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**Surfaces marked **“**” are gauging surfaces and need to be machined.
Material: 0.25” steel plate

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Gauge Construction
Tolerances
Unless Otherwise Specified

3 Place Decimals ± .004
2 Place Decimals ± .03
1 & 0 Place Decimals ± .12

Angles in:
Degrees, Minutes ± 0.5°
Degrees Only ± 1°

A.A.R. Standard M-214 Acceptance
Distance Between Gibs: ±.125, -.062
Distance Across Lands: ±.125, -.0625
A.A.R. Ref.: EC-1150
RECOMMENDED INSPECTION AND REPAIR PROCEDURES (CONT.)

**Bolster Slope Surface Angle**

**Inspection:**
1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Surfaces designated “X” must contact bolster spring seat.
3. Surface “Y” must contact bolster slope surface.
4. Run gauge side-to-side over bolster spring seat (except where prohibited by spring retainers and side walls).
5. If a 0.188” thick by 0.50” wide feeler can be inserted at any point between surface “Y” and bolster slope surface, repair slope surface.
6. If there is a gap greater than 0.25” anywhere below scribe line (towards bolster spring seat), casting cannot be repaired.
7. If there is a gap greater than 0.75” at the top of the bolster slope surface, the casting cannot be repaired.

**Repair and Post Repair Inspection:**
1. Unless gauge shows unequal amounts of wear, apply equal amounts of weld to both slope surfaces.
2. Form a bead of weld at inside and top edges of slope surface to be repaired.
3. Build up slope surface using puddle weld method and grind.
4. After repairs, reapply gauge.
5. Check repairs by trying to place a 0.094” thick by 0.50” wide feeler between surface “Y” and slope surface.
6. If this feeler can be placed, repeat repair.
7. Surface should conform to SCRATA level H-2.
**Recommended Inspection and Repair Procedures (cont.)**

**Bolster Distance Between Slope Surface Construction Points**

**Inspection:**

1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Apply gauge with surfaces “X” contacting bolster spring seat.
3. One point “Y” must contact a bolster slope surface.
4. Applicable stand-off pin must contact bolster side wall.
5. If a 0.188” thick by 0.50” wide feeler can be placed between opposite point “Y” and bolster slope surface, repair slope surface.

**Repair and Post Repair Inspection:**

1. Form a bead of weld at inside and top edges of slope surface to be repaired.
2. Build up slope surface using puddle weld method and grind.
3. After repairs, reapply gauge.
4. If inspection feeler can be placed, repeat repair.
5. Surface should conform to SCRATA level H-2.

**END OF BOLSTER SHOWING PROPER CONSTRUCTION POINT GAUGE PLACEMENT**

- **Surfaces marked **“**” are gauging surfaces and need to be machined.
- **Material:** 0.25” steel plate

---

**GAUGE CONSTRUCTION TOLERANCES UNLESS OTHERWISE SPECIFIED**

<table>
<thead>
<tr>
<th>Tolerances</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Place Decimals</td>
<td>± .004</td>
</tr>
<tr>
<td>2 Place Decimals</td>
<td>± .03</td>
</tr>
<tr>
<td>1 &amp; 0 Place Decimals</td>
<td>± .12</td>
</tr>
</tbody>
</table>

**Angles:**

- Degrees, Minutes ± .5°
- Degrees Only ± 1°

**A.A.R. Standard M-214 Acceptance**

**Construction Point +.125, -.062**

**A.A.R. Ref.: EC-1150**
RECOMMENDED INSPECTION AND REPAIR PROCEDURES (CONT.)

Confirming Bolster Clearance Between Sloped Surfaces and Winged Surfaces

**POST REPAIR INSPECTION:**

1. Confirm bolster clearance between slope surfaces and winged surfaces with the Winged Clearance gauge.
2. Remove any fins or protrusions that have formed due to wear prior to gauge application.
3. With surfaces designated “X” contacting winged surfaces, slide gauge into friction shoe pocket.
4. If gauge cannot be inserted to full depth of friction shoe pocket, repeat repair of slope surface (MC 17 and MC 18).
5. Surface should conform to SCRATA level H-2.

**GAUGE CONSTRUCTION TOLERANCES UNLESS OTHERWISE SPECIFIED**

- 3 PLACE DECIMALS ± .004
- 2 PLACE DECIMALS ± .03
- 1 & 0 PLACE DECIMALS ± .12

**ANGLES IN:**

- DEGREES, MINUTES ± .5º
- DEGREES ONLY ± 1º

**SURFACES MARKED ″X″ ARE GAUGING SURFACES AND NEED TO BE MACHINED.**

**MATERIAL:** 0.25" STEEL PLATE

---

END OF BOLSTER SHOWING PROPER WINGED CLEARANCE GAUGE PLACEMENT
**Recommended Inspection and Repair Procedures (cont.)**

**Bolster Gib Restoration**

**Inspection:**
1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Position gauge for inner and outer gibs as marked with surfaces designated "X" contacting bolster lands.
3. Visually center gauge between bolster pocket side walls. Run gauge through full height of gibs.
4. Repeat for all bolster fiction shoe pockets.
5. If a 0.109" thick by 0.50" wide feeler can be inserted anywhere on either gib, repair the gibs.

**Repair and Post Repair Inspection:**
1. 1st Method: Build up surface using puddle weld method and grind.
2. 2nd Method: Grind gib flush with land surface and weld a separable gib in place.
3. Grind excess weld deposit flush with top, bottom, and outside casting surfaces.
4. If inspection feeler can be inserted anywhere on either gib, repeat repair.

---

**END OF BOLSTER SHOWING PROPER GIB RESTORATION GAUGE PLACEMENT**

**Gauge Construction Tolerances**

- **Tolerances:**
  - 3 PLACE DECIMALS ± .004
  - 2 PLACE DECIMALS ± .03
  - 1 & 0 PLACE DECIMALS ± .12

- **Angles in:**
  - DEGREES, MINUTES ± .5º
  - DEGREES ONLY ± 1º

**A.A.R. Standard M-214 Acceptance**

- DISTANCE BETWEEN GIBS: + .125, -.062
- A.A.R. REF: EC-1148 AND EC-1150
RECOMMENDED INSPECTION AND REPAIR PROCEDURES (CONT.)

Bolster Distance Across Inner Gib

GAUGE

TOP OF BOLSTER

INNER GIB

END OF BOLSTER SHOWING PROPER DISTANCE OVER INNER GIB GAUGE PLACEMENT

Inspection:
1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Gauge must pass over inner gibs. Surface “X” must contact top of bolster.
3. Ensure one “Y” surface contacts an inner gib.
4. If a 0.156" thick by 0.50" wide feeler can be inserted anywhere between opposite “Y” surface and inner gib, repair inner gibs.

Repair and Post Repair Inspection:
1. 1st Method: Build up surface using puddle weld method and grind.
2. 2nd Method: Grind gib flush with land surface and weld a separable gib in place.
3. Grind excess weld deposit flush with top, bottom, and outside casting surfaces.
4. If inspection feeler can be inserted anywhere between opposite “Y” surface and inner gib, repeat repair.

SURFACES MARKED ** ARE GAUGING SURFACES AND NEED TO BE MACHINED.
MATERIAL: 0.25" STEEL PLATE

A.A.R. REF. EC-1150
A.A.R. STANDARD M-214 ACCEPTANCE DISTANCE ACROSS INNER GIBS ± 0.02
GAUGE CONSTRUCTION TOLERANCES UNLESS OTHERWISE SPECIFIED

3 PLACE DECIMALS ± .004
2 PLACE DECIMALS ± .03
1 & 0 PLACE DECIMALS ± .12
ANGLES IN:
DEGREES, MINUTES ± .5°
DEGREES ONLY ± 1°
**Bolster Gib Outer Contour**

**Inspection:**
1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Apply gauge such that surfaces “X” contact bolster spring seat.
3. Gauge must go over outer gibs.
4. Repeat for all bolster ends.

**Repair and Post Repair Inspection:**
1. 1st Method: Build up surface using puddle weld method and grind.
2. 2nd Method: Grind gib flush with land surface and weld a separable gib in place.
3. Grind excess weld deposit flush with top, bottom, and outside casting surfaces.
4. Reapply gauge. If gauge does not go over outer gibs, repeat repair.

---

**END OF BOLSTER SHOWING PROPER OUTER GIB CONTOUR GAUGE PLACEMENT**

**SURFACES MARKED ** ARE GAUGING SURFACES AND NEED TO BE MACHINED. MATERIAL: 0.25" STEEL PLATE**
**Recommended Inspection and Repair Procedures (cont.)**

### Side Frame Column Wear Plate
(ASF-Keystone, Inc. Part # 98-1-10232)

- **Material:** SAE 1095 steel
- **Hardness:**
  - 341-415 Brinell
  - 36.6-44.5 Rockwell C

---

**Inspection:**

1. Determine wear by measuring concavity at center of plate and subtracting this from the nominal edge thickness.

2. Concavity is determined using a straight edge run diagonally across the surface. (NOTE: This does not meet AAR Standard M-214 which allows 0.0625" wear.)

3. Replace any column wear plate that meets either of the following criteria:
   - Cracked, broken, or missing.
   - Worn below 0.25" in thickness representing 0.125" wear.

---

**NOTES:**

1. Plate length and width dimensions referenced from top and right edges as viewed on drawing.

2. Bottom and right edges are those closest to marking stamped on back surface of plate.

3. Length of plate including bulges due to punching to be taken at vertical centerline through bolt holes.

4. Width of plate including bulges due to punching to be taken at horizontal centerline through bolt holes.

5. Plate must not be warped more than 0.031" and must be reasonably free of scale.
**Recommended Inspection and Repair Procedures (cont.)**

**Side Frame Column Wear Plate Installation**

---

**Installation of Wear Plate:**
1. Remove any existing filler weld.
2. Thoroughly clean column faces.
3. Thoroughly clean back of columns around fastener holes.
4. In event of worn column faces and/or the desire to reduce distance between column wear plates, shims must meet the following criteria:
   a. Allowable thickness: 0.125" to 0.1875"
   b. Material: Mild Steel
   c. Cut to the same size as the column wear plate.
   d. Equal size shims must be applied to each column to prevent off center application.
5. Apply column wear plates as follows:
   a. Column wear plate to be free of paint and lubricants (before and after installation).
   b. Use two 0.75" diameter fasteners per AAR S-320 or S-3003, latest revision.
   c. Apply fasteners per fastener manufacturer’s recommendations.
   d. Apply filler welds (if applicable) using an AWS/ASTM E-312-16 weld consumable.

**Fastener Requirements:**
1. If a 0.015" thick by 0.5" wide feeler can be inserted at three or more locations, remove and rework surfaces.
2. If this feeler can be inserted at consecutive locations around the fastener, remove and rework surfaces.

**Acceptance of Wear Plate Installation:**
1. Column wear plate to be free of paint and lubricants (before and after installation).
2. Column wear plate application must meet the requirements of Column Spacing and Alignment GO gauge and Column Spacing and Alignment NO-GO gauge.
3. Filler weld (if applicable) to be flush to 0.12" maximum below face of column wear plate.
4. A 0.031" thick by 0.50" wide feeler must not insert between side frame column and column wear plate more than 0.50".
5. Fastener (Rockford bolt) must sit tight against backside of column.
6. Fastener must extend beyond end of nut a minimum of two full threads.
7. Fastener must not extend beyond face of column wear plate.
8. Fastener must have a minimum of 300 ft-lb of torque, 350 ft-lb is nominal.
**Recommended Inspection and Repair Procedures (cont.)**

**Side Frame Column Width**

**Inspection:**
1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Apply gauge such that surface “X” contacts either side frame column or wear plate.
3. One “Y” surface must contact outside surface of column.
4. Gauge must pass full height of column. Repeat for all side frame columns.
5. Make note of wear patterns on outside surface of column and check amount of wear by laying a straight edge vertically along outside surface of column.
6. If a 0.219” thick by 0.50” wide feeler can be inserted at any point between opposite “Y” surface and column, repair column surface.

**Repair and Post Repair Inspection:**
1. Build up surface using puddle weld method and grind.
2. If inspection feeler can be inserted at any point between opposite “Y” surface and column, repeat repair.
3. Check by laying a straight edge laid vertically along outside surface of column.

---

**Cut-Away of Side Frame Showing Proper Column Width Gauge Placement**

**Surfaces Marked “*” are gauging surfaces and need to be machined. Material: 0.25” Steel Plate.**

**A.A.R. Standard M-214 Acceptance**

<table>
<thead>
<tr>
<th>Column Width:</th>
<th>125, .002</th>
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</thead>
<tbody>
<tr>
<td>A.A.R. Ref.</td>
<td>EC-1155</td>
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</table>

---

**Gauge Construction Tolerances Unless Otherwise Specified**

<table>
<thead>
<tr>
<th>Tolerances</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Place Decimals</td>
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<tr>
<td>2 Place Decimals</td>
<td>± .03</td>
</tr>
<tr>
<td>1 &amp; 0 Place Decimals</td>
<td>± .12</td>
</tr>
</tbody>
</table>

Angles:
- Degrees, Minutes ± .5°
- Degrees Only ± 1°
RECOMMENDED INSPECTION AND REPAIR PROCEDURES (CONT.)

Side Frame Column Spacing and Alignment GO Gauge

**Inspection:**
1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Gauge must be tilted to apply. (Gauge is wider than lower bolster opening.)
3. If gauge does not pass full height of columns, repair surfaces.

**Repair and Post Repair Inspection:**
1. To restore column spacing, apply new column wear plates.

---

**TOP AND SIDE VIEW OF SIDE FRAME SHOWING PROPER COLUMN SPACING AND ALIGNMENT GAUGE PLACEMENT**

**Inspection:**
1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Gauge must be tilted to apply. (Gauge is wider than lower bolster opening.)
3. If gauge does not pass full height of columns, repair surfaces.

**Repair and Post Repair Inspection:**
1. To restore column spacing, apply new column wear plates.

---

**GAUGE CONSTRUCTION TOLERANCES UNLESS OTHERWISE SPECIFIED**

- 3 PLACE DECIMALS ± .004
- 2 PLACE DECIMALS ± .03
- 1 & 0 PLACE DECIMALS ± .12

**ANGLES IN:**
- DEGREES, MINUTES ± .5º
- DEGREES ONLY ± 1º

A.A.R. STANDARD M-214 ACCEPTANCE
DISTANCE BETWEEN FRICTION PLATES: +.156, -.062
WITHIN THIS TOLERANCE RANGE, DISTANCE BETWEEN FRICTION PLATES AT BOTTOM SHALL NOT EXCEED +.125, -.062 RELATIVE TO TOP
A.A.R. REF: EC-1155 AND M-210 EC-1120

**SURFACES MARKED ** ARE GAUGING SURFACES AND NEED TO BE MACHINED. MATERIAL: 0.25" STEEL PLATE.
RECOMMENDED INSPECTION AND REPAIR PROCEDURES (CONT.)

Side Frame Column Spacing and Alignment NO – GO Gauge

**Inspection:**

1. Remove any fins or protrusions that have formed due to wear prior to gauge application.
2. Gauge must be applied from both sides and full height of column.
3. If gauge will insert anywhere between column wear plates, repair surfaces.

**Repair and Post Repair Inspection:**

1. Restore column spacing by applying new column wear plates.
2. Reapply gauge. If gauge will insert anywhere between column wear plates, shims may be added per AAR Standard, M-214.
**Recommended Inspection and Repair Procedures (cont.)**

**Friction Shoes**

**Inspection:**
1. Place straight edge diagonally across slope surface.
2. If slope surface has a concavity of 0.0625” or more, replace friction shoe.
3. If visual indicator is missing, replace friction shoe.
4. If 0.125” or less of visual indicator remains, replace friction shoe to ensure adequate service life until next repair cycle.

**Note:**
For friction shoes produced by a manufacturer other than ASF-Keystone, Inc., see manufacturer’s recommended procedures for inspection and repair.

**Important:**
1. New friction shoes should be applied to bolster friction shoe pockets that have been weld repaired.
2. If any friction shoe is replaced due to wear, opposite friction shoe in that bolster end should also be replaced.
**Recommended Inspection and Repair Procedures (cont.)**

**Control Coils**

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Spring No.</th>
<th>Outside Diameter “A”</th>
<th>Nominal Free Height “B” (New)</th>
<th>* Minimum Free Height (Used)</th>
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</thead>
<tbody>
<tr>
<td>Outer</td>
<td>11-1-05062</td>
<td>5062</td>
<td>5.00</td>
<td>12.56</td>
</tr>
<tr>
<td>Inner</td>
<td>11-1-05063</td>
<td>5063</td>
<td>3.31</td>
<td>12.69</td>
</tr>
</tbody>
</table>

**Inspection:**
1. Reference AAR Field Manual Rule 50 for load spring condemning limit.
2. Replace all control coils that do not meet minimum free height criteria specified.

**Note:**
* Control remains but replacement is indicated at minimum free height shown.

**Important:** If any control coil is replaced due to minimum free height, opposite control coil in that bolster end should also be replaced.
The AdapterPlus Truck Steering Solution

The Amsted Rail AdapterPlus Truck Steering Solution has two components: a specially designed roller bearing adapter and a high performance resilient polymer pad. Working together the components provide approved trucks with controlled passive steering to meet the requirements of the AAR’s M-976 performance specification.

To ensure that the AdapterPlus provides ongoing performance it should be regularly inspected. While a physical inspection method is provided, several other factors, such as service life and poor performance due to other components are included in the replacement criteria for the polymer pad.

Pad Inspection & Replacement

Inspection

Regular inspection can be made while the pad is in the applied position on the truck, but a more thorough inspection should be made any time the wheel set is removed from the truck.

Inspection When Applied

1. Check that the AdapterPlus is applied on all four wheel sets of the car. AdapterPlus should not be mixed with any other roller bearing adapter systems on the same truck or car.

2. Check that the pad is not missing and is visible on each wheel set.

3. Check that the AdapterPlus pads are not being used with non-AdapterPlus roller bearing adapters.

4. Pad Clearance: Inspect the clearance between the pedestal roof and the adapter rail. Some pads have inspection tabs protruding from each end, others do not.
   a. With inspection tabs – Check that there is a clearance between the top of each of the four tabs and the pedestal roof. Check that each of the four inspection tabs are visible.
   b. Without inspection tabs - Measure the distance between the pedestal roof and the adapter rail. At least 1/16” clearance between any point along the pedestal roof / adapter rail interface should be maintained.
5. **Pad Distortion:** Any AdapterPlus Pad exhibiting serious cracks or tears (defined as: a crack or tear penetrating through the top and bottom surfaces), or any serious deformation, such as excess material that appears to be ground off or deformed (shown below), should be replaced with a mate pad. In addition, further inspection of the truck components (Wheels, Bearings, Side Bearings, and Brake Rigging) and the mate Amsted Rail AdapterPlus assembly is recommended as this is typically an indication of excess wear of one or all of these components.

![Image of Pad Distortion](image1.png) ![Image of Pad Distortion](image2.png)

**Inspection Upon Removal**

1. If the wheel set has been removed, check the reason and any “Why Made” codes for wheels or bearings.

2. Check the date of manufacture of the pad. The date is stamped on one of the pad legs (see photographs below). A circular date stamp system is used, one circle showing the year and month – the other showing the day. For instance, in the photograph below the “04” on either side of the arrow (lower circular stamp) signifies the year 2004, and the arrow points to the month – “4” (April). The pad was manufactured on April 2004.

![Image of Date Stamping](image3.png) ![Image of Date Stamping](image4.png)
Replacement Criteria

Replace both pads on an axle if one or more of the following criteria is met:

1. A pad is missing.
2. Insufficient pad clearance.
3. The wheels have been removed with "Why Made" codes:
   - 31 - Fire or heat damage per rule 95
   - 60 - Flange thin
   - 62 - Flange vertical
   - 63 - Hollow Worn
   - 64 - Flange high
   - 73 - Rim thin
4. The roller bearings have been removed with "Why Made" codes:
   - 31 - Fire or heat damage per Rule 95
   - 50 - Roller bearing overheated
   - 95 - Roller bearing fused due to overheating
5. The pad is ten or more years old.
6. Cracks go all the way through the pad.
7. One pad on the wheel set has been replaced then the other pad must also be replaced.
8. If the pad originally contained inspection tabs and now one or both are missing.

Note: AdapterPlus adapters and pads can be replaced independently of one another. The adapter casting does not have to be replaced every time the pad is replaced.

The AdapterPlus Pad part numbers are as follows:

<table>
<thead>
<tr>
<th>Journal</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 11</td>
<td>10471 (PN 2253)</td>
</tr>
<tr>
<td>(6 ½ x 9)</td>
<td>10601 (Green)</td>
</tr>
<tr>
<td>Or</td>
<td>10454 (Blue)</td>
</tr>
<tr>
<td>(6 ½ x 12)</td>
<td>(PN 1235 &amp; PN 1769)</td>
</tr>
<tr>
<td>7 x 12</td>
<td>10457 (PN 2212)</td>
</tr>
</tbody>
</table>

* Note: Part Numbers in italics are superseded by bolded part numbers.

IMPORTANT:
M-976 Approved cars built after January 1st 2009 must take 10601 (Green) pad.
Cars built prior to January 1st 2009, have been furnished with a variety of designs, replacement pads should be replaced in kind.
Refer questions concerning specific adapter pads to Amsted Rail.
Roller Bearing Adapter Inspection & Replacement

Inspection

1. Check that the adapter is not displaced, broken, cracked or missing.

2. Check if the pad is worn to the extent that the pedestal roof has worn the top of the adapter. The AdapterPlus casting does not contain a crown wear indicator, as found on standard adapters.

3. The underside surfaces of the adapter are subject to the same wear criteria as the standard adapters. The same inspection methods shall be applied.

Note: Wear associated with brake reaction, as well as the use of the adapter body wear gauge, is not applicable.

Replacement Criteria

Replace the adapter if one or more of the following criteria is met:

1. The adapter is broken, cracked or missing.

2. The pedestal roof has worn the top of the adapter.

3. The underside surfaces of the adapter do not meet criteria for a standard adapter.

Note: It is recommended that a standard side frame pedestal key, AAR S-377, be used with all Adapter Plus applications.

The AdapterPlus Adapters part numbers are as follows:

<table>
<thead>
<tr>
<th>Journal</th>
<th>Pat Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 11</td>
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<tr>
<td>6 ½ x 9</td>
<td>1771 (PN 1771)</td>
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<td>6 ½ x 12</td>
<td>1233 (PN 1233)</td>
</tr>
<tr>
<td>7 x 12</td>
<td>10458 (PN 2218)</td>
</tr>
</tbody>
</table>

* Note: Part Numbers in italics are superseded by bolded part numbers.
References

For maintenance and repair manual for constant contact side bearings please see http://www.asfglobal.com/railroadproducts.asp.

The following is a partial list of applicable regulations governing Freight Car Truck Maintenance and Repair. Though far from complete, this highlights those most widely used.

- Classification and Repair Procedures – AAR Standard M-214
- Quality Assurance – AAR Specification M-1003
- Load Coils – AAR Interchange Rule 50
- Bolster Gibs – AAR Interchange Rules 47 and 48
- Bolster Center Plate – AAR Interchange Rule 47
- Side Frame Pedestal – AAR Interchange Rule 48
- Side Frame and Bolster Weld Repairs – AAR Interchange Rules 47 and 48
- Side Bearing Adjustment – AAR Interchange Rule 47
- Prohibited in Interchange – AAR Interchange Rule 90
- Mechanical Requirement for Acceptance – AAR Interchange Rule 88
- AAR Manual of Standards and Recommended Practices – Section D
- AAR Manual of Standards and Recommended Practices – Section D – Part II

For information concerning SCRATA Levels of Surface Finish contact:
Casting Development Centre
7 East Bank Road
Sheffield, S2 3PT UK
Phone: +44 (0) 114 272 8647
Fax: +44 (0) 114 273 0852
Web: http://www.castingsdev.com

Per AAR Standard M-210 – Appendix C the following are recommended lubricants:

Recommended
Dow Corning Molykote BR-2 Plus
Dow Corning Corporation
Midland, Michigan 48640

Alternate
Lubriplate – Gear Shield Extra Heavy (part no. 15263)
Extreme Pressure Lubricant
Fiske Brothers Refining Company
Toledo, Ohio 43605

Alternate
Lubriplate – Gear Shield Extra Heavy
Part No. L0152-035
Fiske Brothers Refining Company
Toledo, Ohio 43605