



Technical Bulletin

Checking the Tie Rod End Castle Nut Torque on Meritor Bus and Coach Non-Drive Steer and Tag Axles

MFS12155ANL16, FH946KX5, FH946KX41 and FH946KX52 Models Produced from 7-19-2014 through 12-5-2014

Hazard Alert Messages

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip and fall over. Serious personal injury and damage to components can result.

Tie Rod End Castle Nut Torque Check

This technical bulletin provides instructions to check the torque and, if required, tighten the tie rod end castle nuts on MFS12155ANL16, FH946KX5, FH946KX41 and FH946KX52 models produced from 7-19-2014 through 12-5-2014. Instructions are also provided to inspect and replace the tie rod arms and tie rod ends, if required. Figure 1.

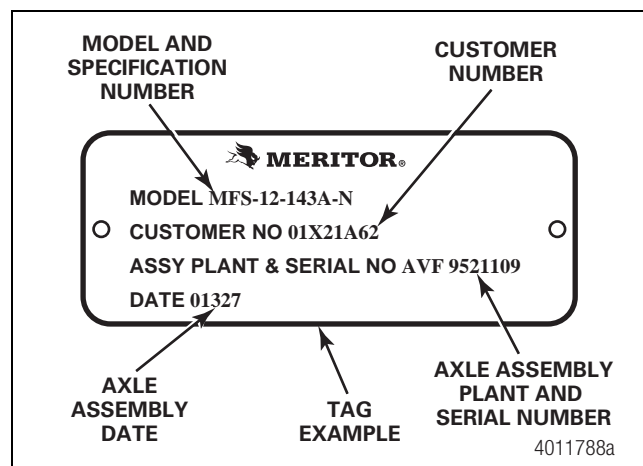


Figure 1

NOTE: The date is in a Julian date format. Example: 01327 = 327th day of 2001 or 11-23-2001.

How to Obtain Additional Maintenance, Service and Product Information

Refer to Maintenance Manual 23, Bus and Coach Front and Tag Axles. To obtain this publication, visit Literature on Demand at Meritor.com.

How to Obtain Parts

The tie rod end cotter pin used in this procedure may be obtained locally or ordered from Meritor's Commercial Vehicle Aftermarket in Florence, Kentucky by calling 888-725-9355; or in Brampton, Ontario, Canada by calling 905-454-7070.

Parts Required for Torque Check

- Cotter pin, 1/8" x 1.5", part number K-2412 (quantity 1), 2 cotter pins are required per axle

Tools Required

- Torque wrench, click or sweep face
- 7/8" deep-well socket for castle nut
- 5/8", 3/4" and 1-1/8" sockets
- Set of box-end wrenches
- Lineman's pliers or diagonals to pry or cut cotter pins

Contact the Meritor OnTrac™ Customer Call Center for Additional Assistance

If you have any questions about the instructions in this technical bulletin or would like further assistance, contact the Meritor OnTrac™ Customer Call Center at 866-Ontrac1 (668-7221). Refer to Program: C15AB.

Standard Repair Time (SRT)

The standard repair time is 0.2 hours per side per axle for checking the torque and, if required, tightening of the tie rod end castle nut(s). Additional times are as follows.

- 0.2 hours per side for inspection of tie rod stud and tie rod arm bore, if required
- 0.3 hours replacement of each tie rod end, if required
- 0.4 hours replacement of each tie rod arm, if required

Check the Torque on Tie Rod End Castle Nuts

⚠ WARNING

Consult with the Original Equipment Manufacturer (OEM) on any additional instructions for raising the unit. If the correct procedures are not followed, serious personal injury and damage to components can result.

1. Wear safe eye protection. Park the vehicle on a level surface.
2. Place blocks under the wheels not being serviced to keep the vehicle from moving.
3. Raise the vehicle so that the wheels you will service are off the ground. Support the vehicle with safety stands.
4. Remove the cotter pin that secures the tie rod end castle nut to the tie rod arm. Figure 2.

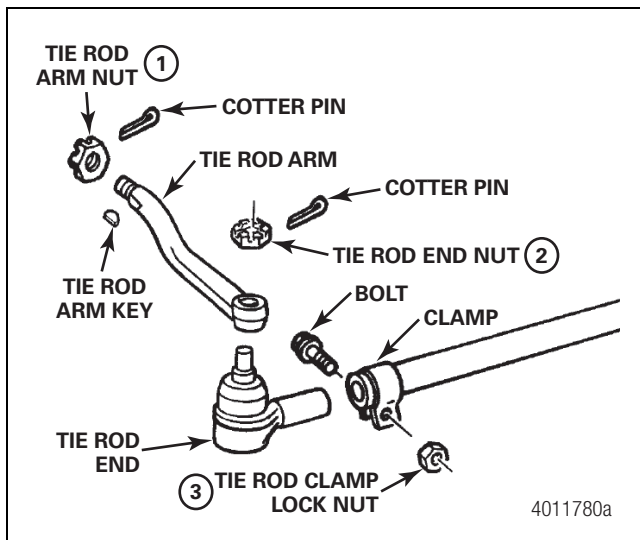


Figure 2

Item	Description	Size	Torque Range in Lb-Ft (N•m)
1	Tie Rod Arm Nut	1.250"-12	775-1450 (1051-1965)
2	Tie Rod End Nut	0.875"-14	160-300 (217-407)
3	Tie Rod Clamp Lock Nut	0.750"-10	155-175 (210-237)

5. Place a calibrated torque wrench on the tie rod end castle nut.
6. As a verification check to ensure the castle nuts are not hand loose or below 25 lb-ft (34 N•m), set the torque wrench to 25 lb-ft (34 N•m). Rotate the tie rod end castle nut in a clockwise direction and note if the nut turns before reaching the set torque. Figure 3.

- **If the tie rod end castle nut does not rotate prior to reaching 25 lb-ft (34 N•m):** Proceed to Step 7.
- **If the tie rod end castle nut rotates prior to reaching 25 lb-ft (34 N•m):** Remove the castle nut and tap the tie rod arm with a brass or leather mallet to check the taper lock. Note it is not necessary to strike the tie rod arm hard to perform this check. On some axles, the ball stud may be mounted above the tie rod arm. In such case, lift up on the tie rod end to verify the taper lock. The taper lock should not separate when the tie rod arm is tapped. The two parts should be locked together.
 - **If the joint separates easily when tapped:** Proceed to the Inspect the Tie Rod Stud and Tie Rod Arm Bore, If Required procedure in this technical bulletin.
 - **If the joint does not separate when tapped:** Proceed to Step 7.

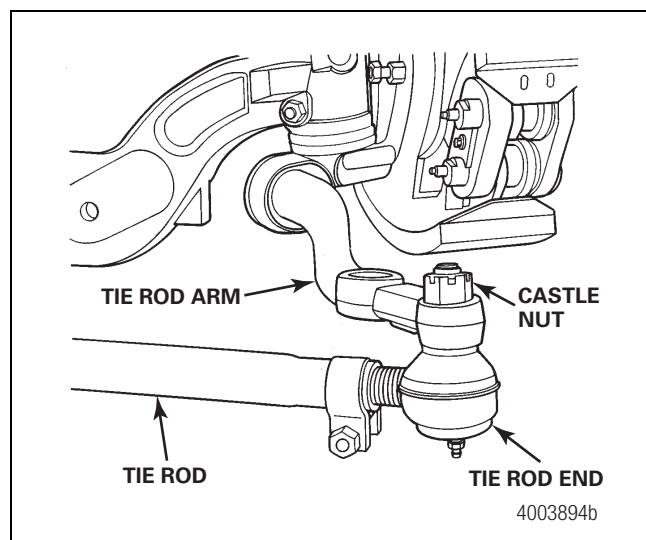



Figure 3

7. Install the tie rod castle nut and tighten to 160 lb-ft (217 N•m). 
8. If the hole for the cotter pin is not aligned, tighten the castle nut to align the next available hole in the nut. Do not loosen the nut to align the cotter pin hole. Install a new cotter pin, part number K-2412 (1/8" x 1.5").
9. The torque check of the castle nut is complete. Repeat the procedure on the opposite side of the vehicle.


Inspect the Tie Rod Stud and Tie Rod Arm Bore, if Required

NOTE: If the taper lock inspection was performed and the taper lock separated, proceed with this procedure. If the taper lock did not separate, this procedure is not required.

1. Remove the cotter pin and nut that fasten the tie rod end to the tie rod arm. Figure 2.

WARNING

Use a brass or leather mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury.

2. Disconnect the tie rod assembly from the tie rod arm. If necessary, use the removal tool to separate the tie rod end from the tie rod arm.
3. Inspect the tie rod end stud surface for damage or fretting.
 - **If damage is found:** Replace the damaged parts. Refer to the Part Replacement Procedures in this technical bulletin.
4. Inspect the tie rod arm bore surface for damage or fretting.
 - **If damage is found:** Replace the damaged parts. Refer to the Part Replacement Procedures in this technical bulletin.
5. Reinstall the tie rod assembly to the tie rod arm if no damage was found.
6. Install the tie rod end castle nut and tighten to 160 lb-ft (217 N•m). 
7. If the hole for the cotter pin is not aligned, tighten the castle nut to align the next available hole in the nut. Do not loosen the nut to align the cotter pin hole. Install a new cotter pin, part number K-2412 (1/8" x 1.5").
8. If necessary, lubricate the tie rod assembly. Refer to the Tie Rod Lubrication Procedure in this technical bulletin.

Part Replacement Procedures

Tie Rod End Replacement

Removal



NOTE: The tie rod has right-hand threads on one end and left-hand threads on the other end. Make sure the correct tie rod ends are installed on the tie rod.

1. Mark the position (length) where each tie rod end is installed in the tie rod. The position of the tie rod ends determines toe-in.

Alternate Method: With the wheels in the straight-ahead position, use a tape measure to measure the width of the complete tie rod assembly, from tie rod end to tie rod end.

2. Remove the bolt and nut from the clamp on the tie rod.
3. Remove the tie rod end from the tie rod. Figure 2.

Installation

1. Install the new tie rod end on the tie rod. Install the tie rod end to the position marked during removal of old tie rod end.
2. Install the nut and bolt in the clamps on the tie rod. Tighten the nut to 155-175 lb-ft (210-237 N•m). 
3. Clean and dry the tie rod end taper and the tie rod arm tapered hole.
4. Connect the tie rod end into the tie rod arm on the knuckle.
5. Install the tie rod end castle nut that fastens the tie rod end to the tie rod arm. Tighten to the castle nut to 160 lb-ft (217 N•m). 
6. Install the cotter pin. If the hole is not aligned, tighten the castle nut to align the next available hole in the nut. Do not loosen the nut to align the cotter pin hole.
7. Check and, if necessary, adjust toe-in. Refer to Maintenance Manual 23 for complete procedures.
8. Lubricate the tie rods. Refer to the Tie Rod Lubrication Procedure in this technical bulletin.

Tie Rod Lubrication Procedure

Lubricate the ends of the tie rod according to the following procedure.

1. Ensure the tires touch the ground.
2. Use a grease gun with 6% 12-hydroxy lithium stearate grease to lubricate the assembly. Apply the lubricant through the grease fittings on the assembly.
3. Apply the lubricant until new lubricant comes from the boot.

Tie Rod Arm Replacement

Removal

NOTE: The tie rod ends will already be separated from the tie rod arm at this point in the process.


1. Disconnect any steering linkage attached to the tie rod arm. Figure 2.
2. Remove the cotter pin and nut that secures the tie rod arm in the knuckle.

WARNING

Use a brass or leather mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury.

3. Remove the tie rod arm from the knuckle. If necessary, tap on the end of the arm with a brass or leather mallet to separate the arm from the knuckle.
4. Remove the key from the tie rod arm.

Installation

1. Install the new key in the slot at the tapered end of the new tie rod arm. Press the key into the slot. Do not mix the arm key and slot types.
 - **Square Key:** Position the key flush to shoulder of the arm taper.
 - **Woodruff Key:** Position the key in the slot provided.
2. Install the tie rod arm in the knuckle.
3. Install the nut that fastens the tie rod arm to the knuckle. Tighten nut to 775-1450 lb-ft (1051-1965 N•m). 
4. Install the cotter pin. If the holes are not aligned, tighten the nut to the next hole in the nut. Do not loosen the nut to install the cotter pin.
5. Connect the tie rod arm to the newly installed or existing tie rod end. Refer to the tie rod assembly instructions in this technical bulletin.
6. Check and, if necessary, adjust toe-in. Refer to Maintenance Manual 23 for complete procedures.

Appendix

Parts used in replacement, if required

Table A: Tag Axle — FH946KX5

Part	Part Number
Tie Rod End, Right	
Tie rod end cotter pin	K2412
Tie rod end	R230134
Tie Rod End, Left	
Tie rod end cotter pin	K2412
Tie rod end	R230133
Tie Rod Arm, Right	
Tie rod arm key	16X1035
Tie rod arm slotted nut	1227Y1715
Tie rod arm cotter pin	K2618
Tie rod arm	3133Q7973
Tie Rod Arm, Left	
Tie rod arm key	16X1035
Tie rod arm slotted nut	1227Y1715
Tie rod arm cotter pin	K2618
Tie rod arm	3133P7972

Table B: Tag Axles — FH946KX41 and FH946KX52

Part	Part Number
Tie Rod End, Right	
Tie rod end cotter pin	K2412
Tie rod end	R230134
Tie Rod End, Left	
Tie rod end cotter pin	K2412
Tie rod end	R230133
Tie Rod Arm, Right	
Tie rod arm key	16X1035
Tie rod arm slotted nut	1227Y1715
Tie rod arm cotter pin	K2618
Tie rod arm	3133T7976
Tie Rod Arm, Left	
Tie rod arm key	16X1035
Tie rod arm slotted nut	1227Y1715
Tie rod arm cotter pin	K2618
Tie rod arm	3133S7975

Table C: Steer Axle — MFS12155ANL16

Part	Part Number
Tie Rod End, Right	
Tie rod end cotter pin	K2412
Tie rod end	R230132
Tie Rod End, Left	
Tie rod end cotter pin	K2412
Tie rod end	R230131
Tie Rod Arm, Right	
Tie rod arm key	16X1035
Tie rod arm slotted nut	1227Y1715
Tie rod arm cotter pin	K2618
Tie rod arm	3133H8796
Tie Rod Arm, Left	
Tie rod arm key	16X1035
Tie rod arm slotted nut	1227Y1715
Tie rod arm cotter pin	K2618
Tie rod arm	3133G8795



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