



## Technical Bulletin

# Converting Unitized Wheel Ends to Conventional Hub Bearings and Wheel Ends on Meritor Coach Front and Tag Axles

FH941KX, FH946KX, MCI4002 and MCI6003 Axles

## 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.

## How to Obtain Additional Maintenance, Service and Product Information

Refer to Maintenance Manual 23, Bus and Coach Front and Tag Axles; Maintenance Manual MM-0409, Wheel-End Components; Maintenance Manual MM-0467, EX+™ Air Disc Brake; and technical publication TP-89159, Axle Wheel Bearing Installation Specifications. To obtain these publications, visit Literature on Demand at meritor.com.

## Converting Unitized Wheel Ends to Conventional Hub Bearings and Wheel Ends on Meritor Coach Front and Tag Axles

This technical bulletin provides instructions for converting unitized wheel ends to conventional bearing hubs and wheel ends on certain Meritor coach front and tag axles. Wheel ends can be identified by the features shown in Figure 1 and Figure 2. Affected models are shown in Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, Figure 9 and Figure 10.

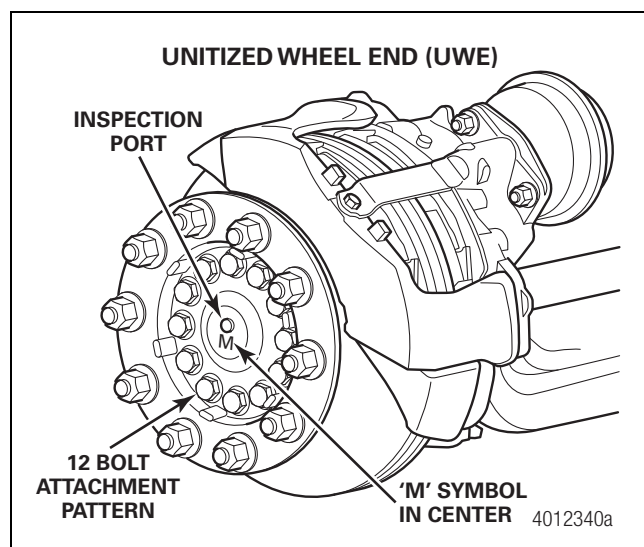


Figure 1

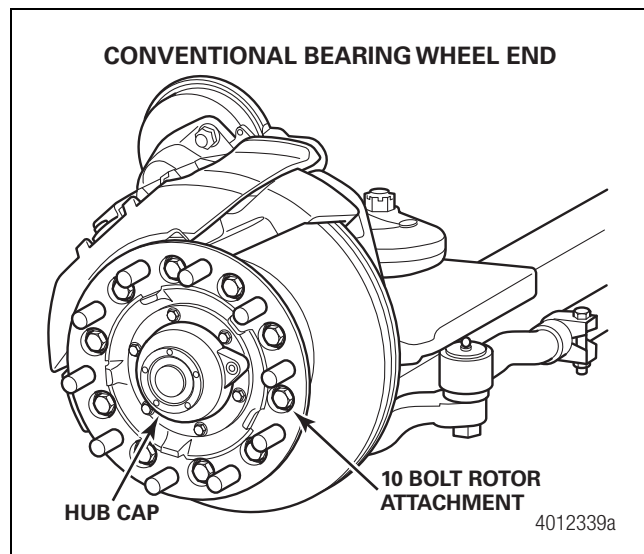


Figure 2

## How to Obtain Kits

Contact Meritor's Commercial Vehicle Aftermarket at 888-725-9355.

## Kits

The following kits are for converting unitized wheel ends to conventional bearing hubs on FH941KX, FH946KX, MCI4002 and MCI6003 axles.

### FH941 Front Axles

**Table A: KIT 13020 — D Coach**

Axle Specification	Brake Angle	Stud Standout	Wheel
FH941KX7	BAF 0°	2.09"	Steel/ Aluminum
FH941KX15	BAF 0°	2.09"	Steel/ Aluminum

**Table B: KIT 13020-A — D Coach**

Axle Specification	Brake Angle	Stud Standout	Wheel
FH941KX20	BAF 0°	1.82"	Steel
FH941KX26	BAF 0°	1.82"	Steel

**Table C: KIT 13020-B — E/J Coach**

Axle Specification	Brake Angle	Stud Standout	Wheel
FH941KX1	BAF 44°	2.09"	Steel/ Aluminum
FH941KX6	BAF 44°	2.09"	Steel/ Aluminum
FH941KX11	BAF 44°	2.09"	Steel/ Aluminum
FH941KX13	BAF 44°	2.09"	Steel/ Aluminum
FH941KX16	BAF 44°	2.09"	Steel/ Aluminum

### FH946 Steerable Tag Axles

**Table D: KIT 13020-B — D Coach**

Axle Specification	Brake Angle	Stud Standout	Wheel
FH946KX11	BAR 44°	2.09"	Steel/ Aluminum
FH946KX22	BAR 44°	2.09"	Steel/ Aluminum

**Table E: KIT 13020-C — D Coach**

Axle Specification	Brake Angle	Stud Standout	Wheel
FH946KX20	BAR 44°	1.82"	Steel
FH946KX36	BAR 44°	1.82"	Steel
FH946KX42	BAR 44°	1.82"	Steel

**Table F: KIT 13020-B — E/J Coach**

Axle Specification	Brake Angle	Stud Standout	Wheel
FH946KX6	BAF 44°	2.09"	Steel/ Aluminum
FH946KX9	BAF 44°	2.09"	Steel/ Aluminum
FH946KX23	BAF 44°	2.09"	Steel/ Aluminum

### MC14/MC16 Frame Tag Axles

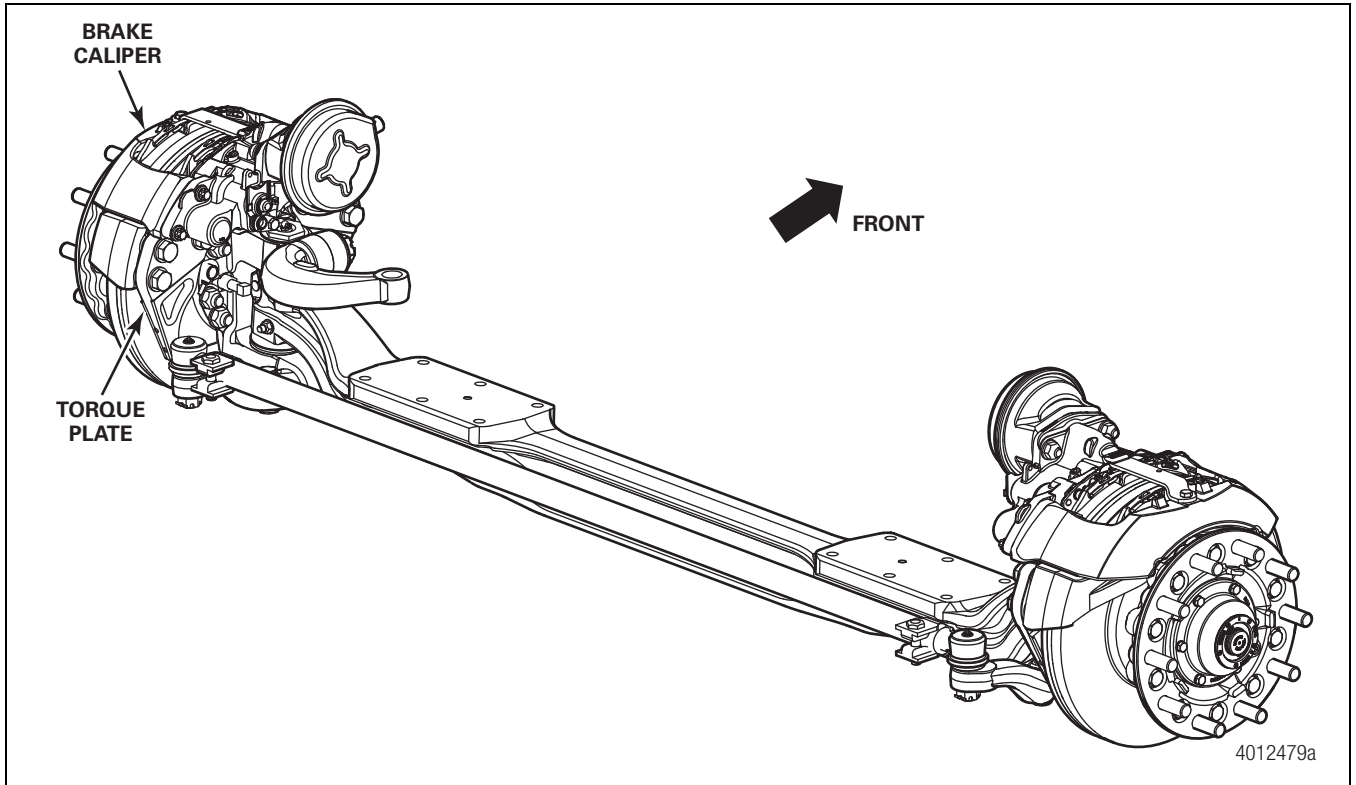
**Table G: KIT 13018 — D Coach**

Axle Specification	Brake Angle	Stud Standout	Wheel
MC14002NSNK1	BAR 60°	2.09"	Steel/ Aluminum
MC14002NSNK4	BAR 60°	2.09"	Steel/ Aluminum

**Table H: KIT 13018 — E/J Coach**

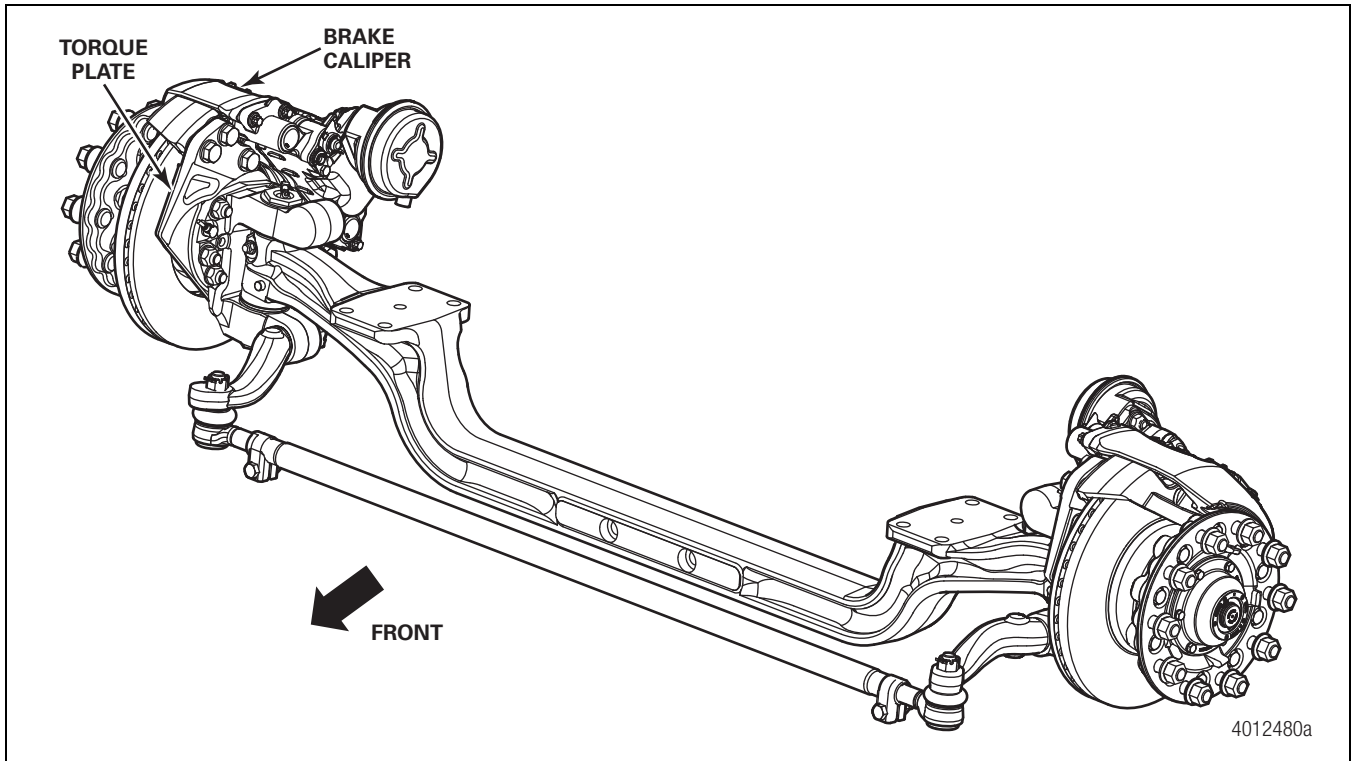
Axle Specification	Brake Angle	Stud Standout	Wheel
MC16002NSNK4	BAR 60°	2.09"	Steel/ Aluminum
MC16002NSNK6	BAR 60°	2.09"	Steel/ Aluminum
MC16002NSNK8	BAR 60°	2.09"	Steel/ Aluminum

### FH941 Front Axle with BAF-0 Oriented Brakes



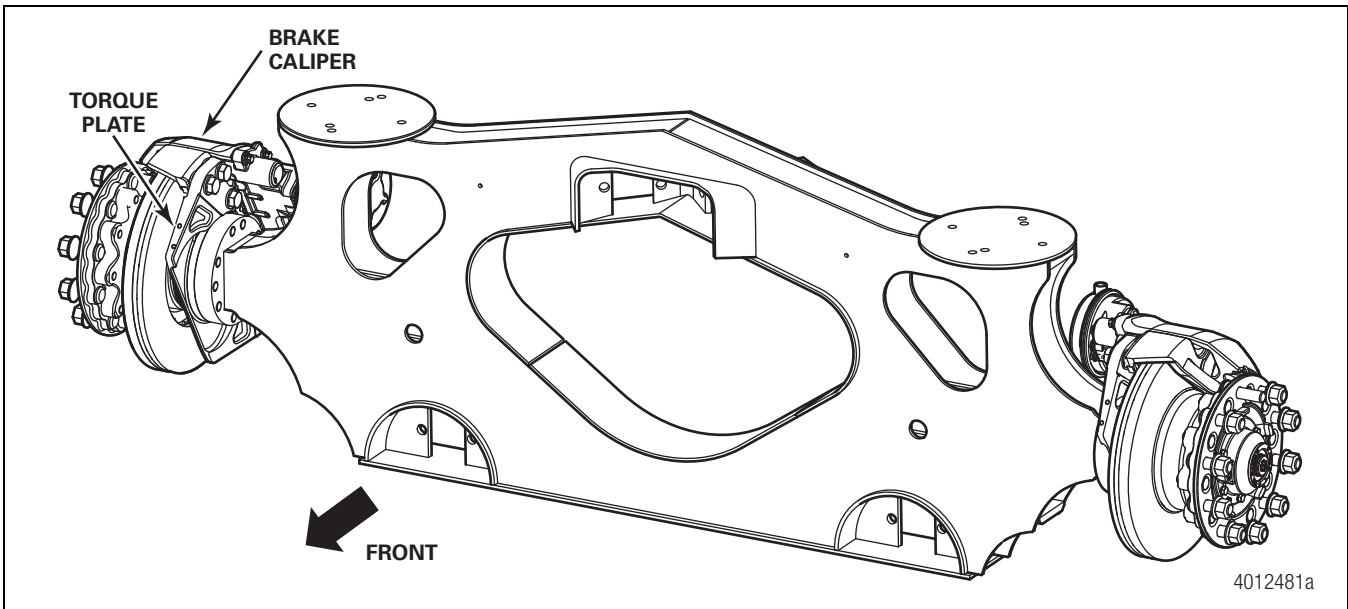
**Figure 3**

### FH946 Tag Axle with BAR-44 Oriented Brakes



**Figure 4**

# MC14 Tag Axle with BAR-60 Oriented Brakes



**Figure 5**

FH 941 and FH 946 Axles

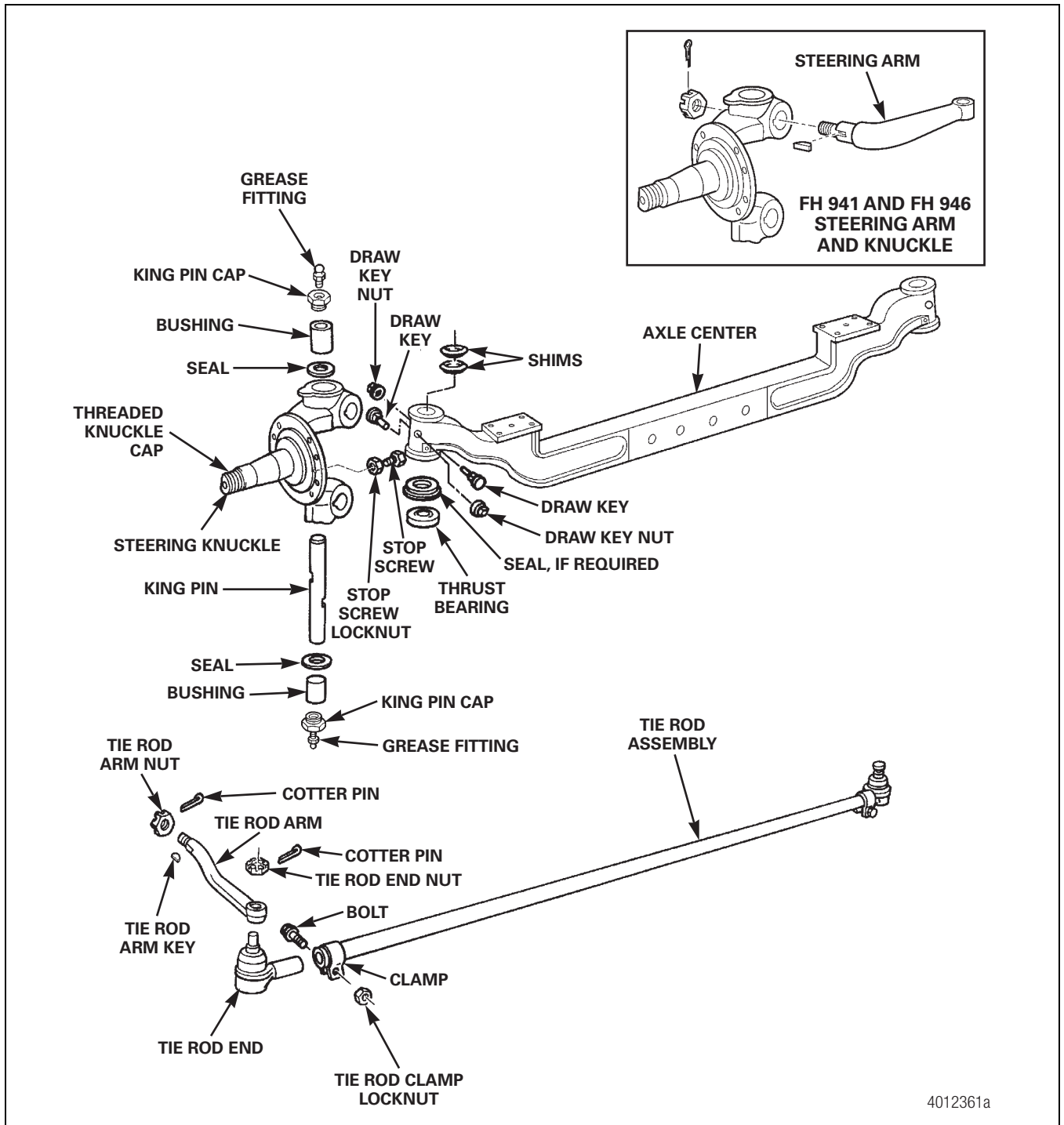
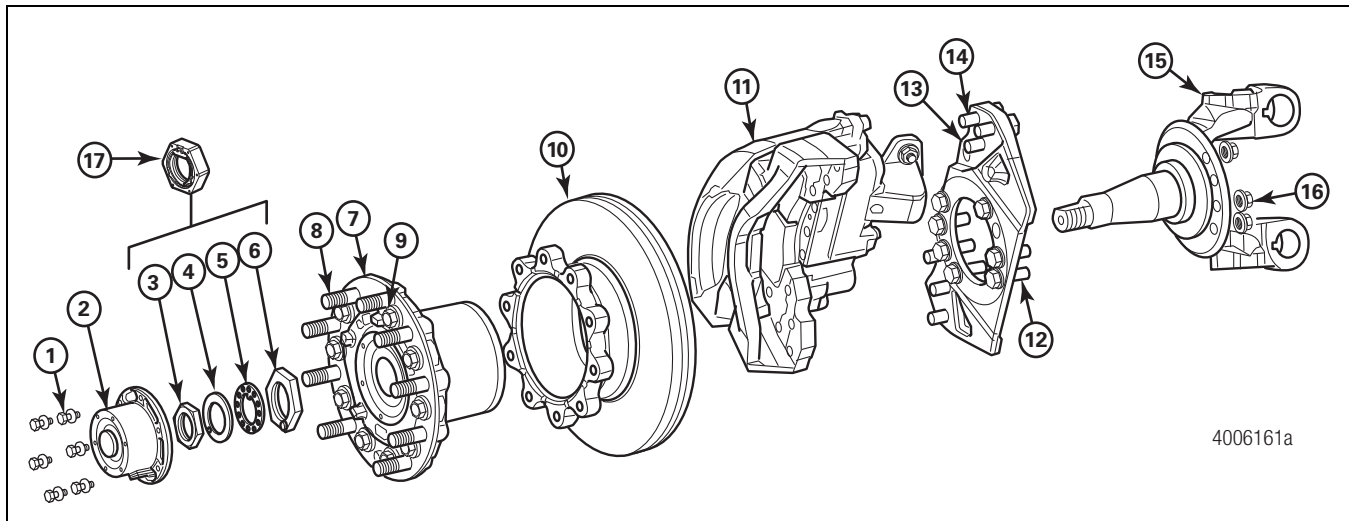


Figure 6

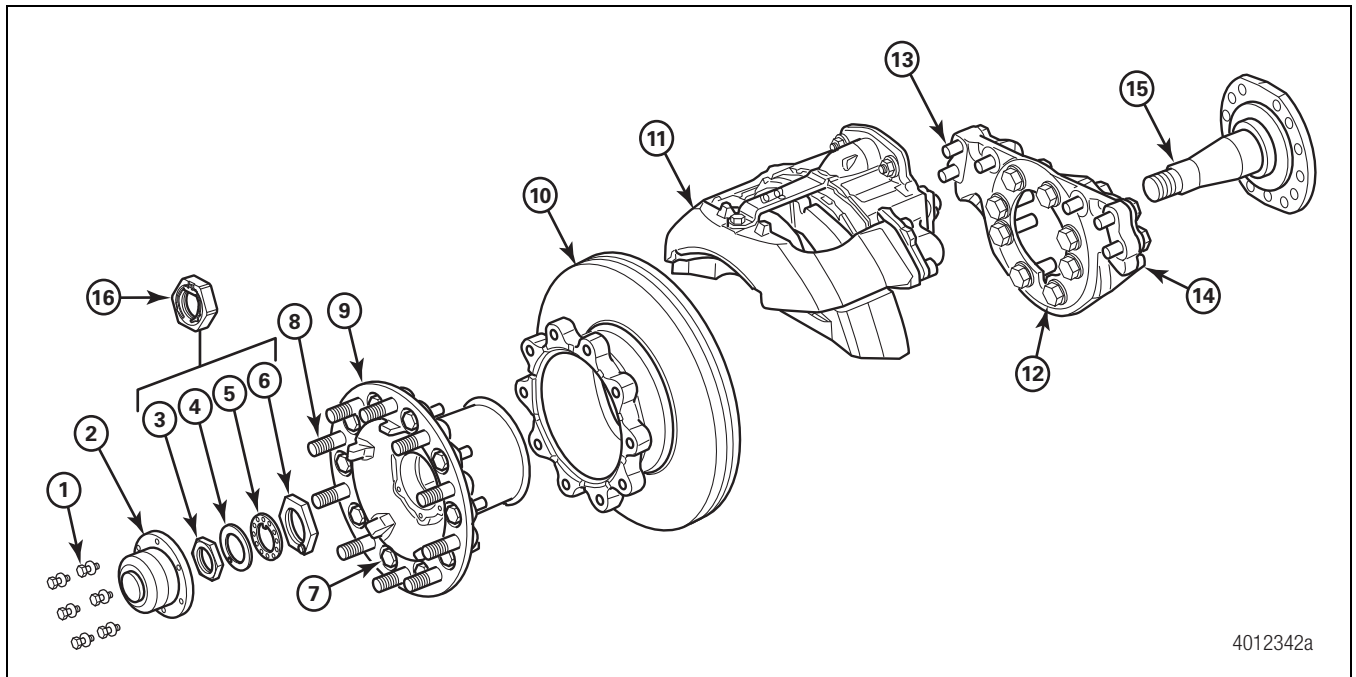
## Conventional Hub — FH Series Front and Steerable Tag Axles with EX+ Brakes



**Figure 7**

Item	Description
1	Capscrew
2	Hubcap
3	Outer Nut
4	Lock Washer
5	Lock Ring
6	Inner Nut
7	Conventional or PreSet® Hub
8	Wheel Stud
9	Rotor-to-Hub Capscrew
10	Rotor
11	EX+ Brake
12	Torque Plate-to-Knuckle Capscrew
13	Torque Plate
14	Torque Plate-to-Caliper Capscrew
15	Knuckle
16	Nut
17	PRO-TORQ™ Nut for PreSet® Hub

## Conventional Hub — MC14 and MC16 Series Tag Axle with EX+ Brakes

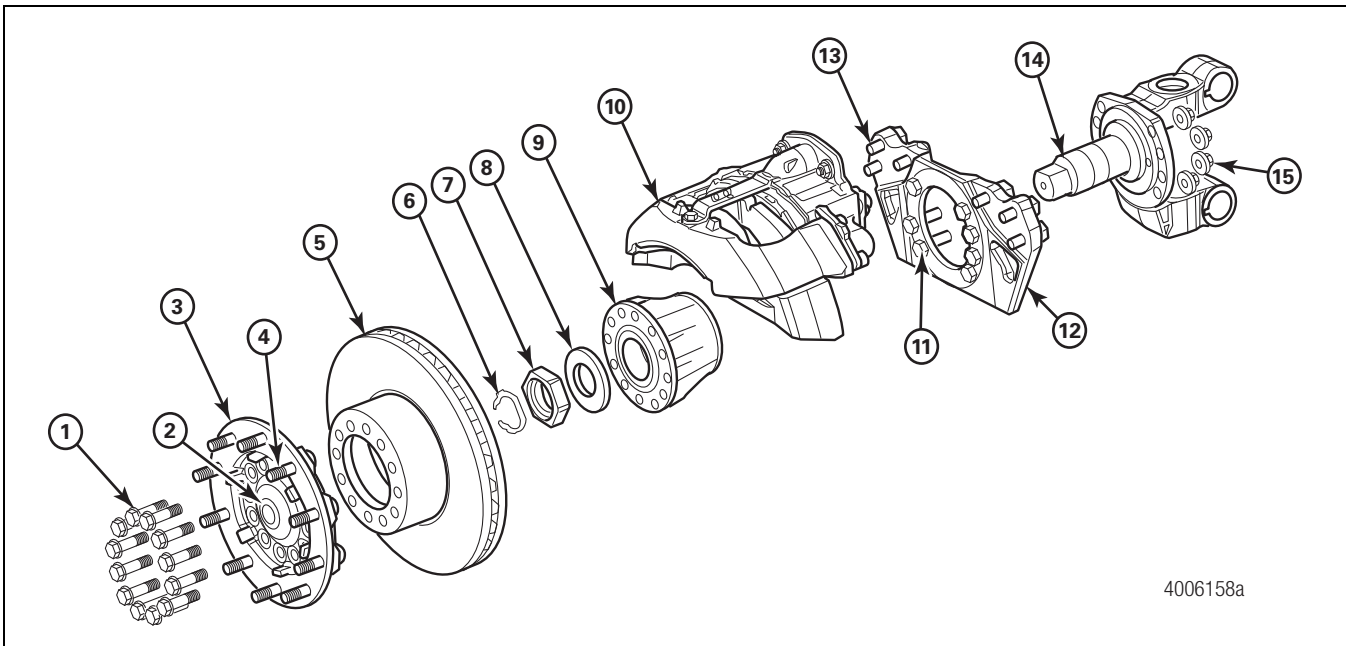


**Figure 8**

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Item	Description
1	Capscrew
2	Hubcap
3	Outer Nut
4	Lock Washer
5	Lock Ring
6	Inner Nut
7	Rotor-to-Hub Capscrew
8	Wheel Stud
9	PreSet® Hub
10	Rotor
11	EX+ Brake
12	Torque Plate-to-Spindle Capscrew
13	Torque Plate-to-Caliper Capscrew
14	Torque Plate
15	Spindle
16	PRO-TORQ™ Spindle Nut

## Unitized Wheel End — FH Series Front Tag Axle with EX+ Brakes



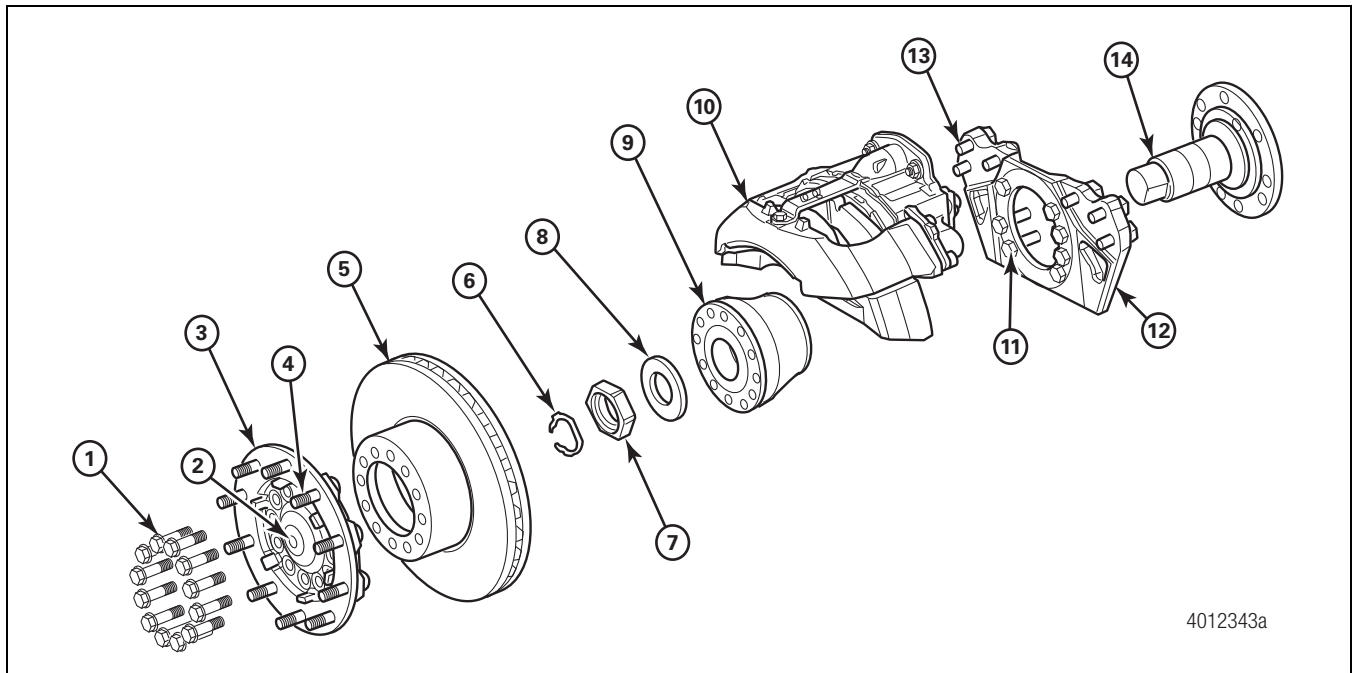
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**Figure 9**

Item	Description
1	Wheel Adapter Capscrew
2	Inspection Plug
3	Wheel Adapter
4	Wheel Stud
5	Rotor
6	Keeper
7	PRO-TORQ™ Spindle Nut
8	Thick Washer
9	Unitized Hub Bearing
10	EX+ Brake Assembly
11	Torque Plate-to-Spindle Capscrew
12	Torque Plate
13	Torque Plate-to-Brake Caliper Capscrew
14	FH Series Knuckle
15	Nut



## Unitized Wheel End — MC Series Tag Axle with EX+ Brakes



**Figure 10**

<b>Item</b>	<b>Description</b>
1	Wheel Adapter Capscrew
2	Inspection Plug
3	Wheel Adapter
4	Wheel Stud
5	Rotor
6	Keeper
7	PRO-TORQ™ Spindle Nut
8	Thick Washer
9	Unitized Hub Bearing
10	EX+ Brake Assembly
11	Torque Plate-to-Spindle Capscrew
12	Torque Plate
13	Torque Plate-to-Brake Caliper Capscrew
14	Spindle

## Removal and Disassembly Procedures

In this section, the unitized wheel-end specific components will need to be removed from the axle. This will include the knuckles/spindles, torque plates, unitized wheel-end bearing assemblies, rotors, PRO-TORQ™ nuts and wheel adapters. The steering arm, tie rod arm and tie rod assemblies will be reused.

### Remove the Wheel-End Components

1. Wear safe eye protection. Park the vehicle on a level surface. Block the rear wheels to prevent the vehicle from moving.
2. Raise the vehicle so that the axle is off the ground. Support the vehicle with safety stands. Do not use a jack to support the vehicle.
3. Remove the wheel and tire assembly.
4. Remove the brake caliper assembly. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake. Keep these parts and fasteners for reuse.
5. Remove the wheel adapter and rotor. Discard these parts.
6. Remove the keeper from the PRO-TORQ™ nut. Use a screwdriver to pry out the keeper arm from the groove on each side of the nut until the keeper is released. Use a 3.5-inch (89 mm) socket wrench to remove the PRO-TORQ™ nut. Discard these parts.
7. Remove the thick washer and unitized hub bearing. Discard these parts.
8. Repeat this procedure to remove the unitized wheel end on the opposite side of the axle.

### Remove the Steering Arm

1. Remove the cotter pin and nut that fasten the steering arm to the drag link. Disconnect the steering arm from the drag link. Figure 11.

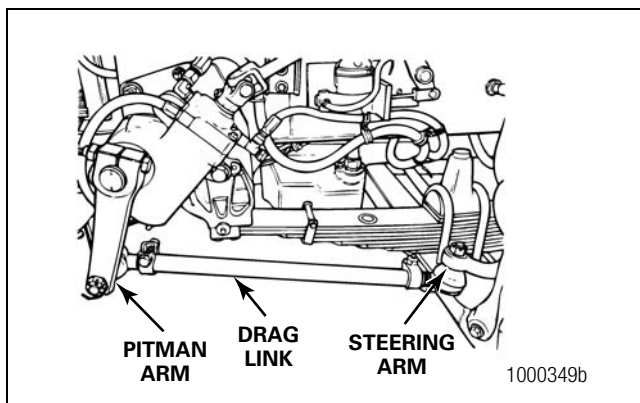


Figure 11

2. Remove the cotter pin and nut that fasten the steering arm to the knuckle. Figure 12.

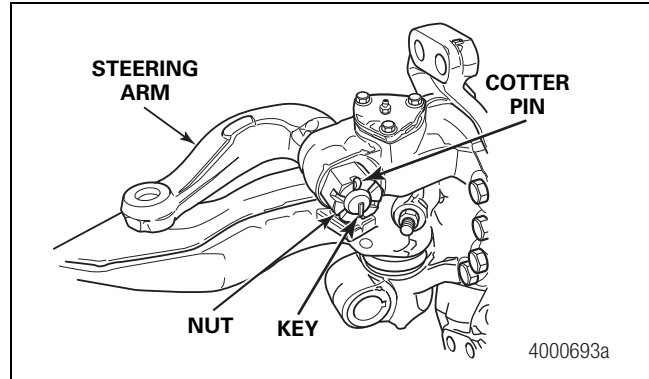


Figure 12

3. Remove the steering arm from the knuckle. If necessary, use a leather or plastic mallet to tap on the end of the arm and separate the arm from the knuckle.
4. Inspect the steering arm. Keep the parts for reuse.

### Remove the Tie Rod Arms, Tie Rod Assembly and Tie Rod Ends

#### ⚠ WARNING

Support the tie rod assembly during maintenance and service to prevent serious personal injury and damage to components.

#### ⚠ CAUTION

Do not heat the arm to remove the tie rod assembly. Heating the tie rod arm will soften parts. Damage to components will result.

1. Remove the cotter pins and nuts that fasten each tie rod end to the tie rod arms. Figure 13.

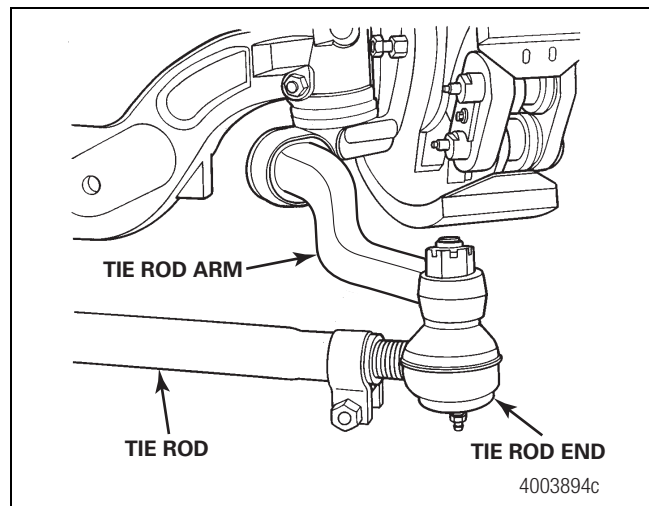


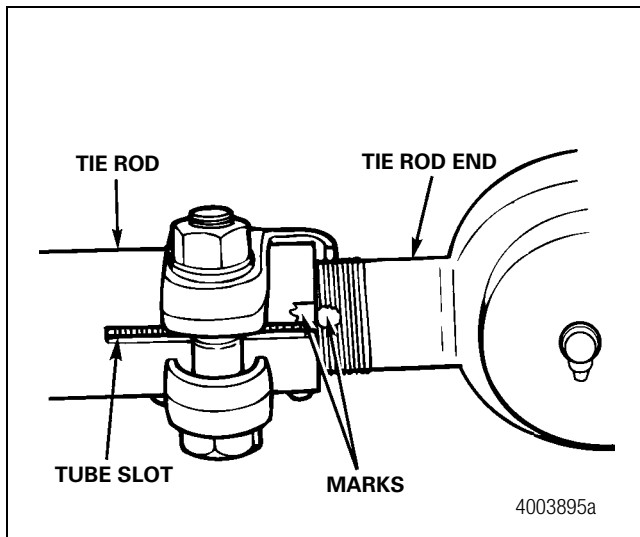
Figure 13

2. Disconnect the tie rod assembly from the tie rod arm. If necessary, use a tie rod end puller to separate the tie rod end from the tie rod arm.
3. Disconnect any steering linkage attached to the tie rod arms.
4. Remove the cotter pin and nut that secures the tie rod arms 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.

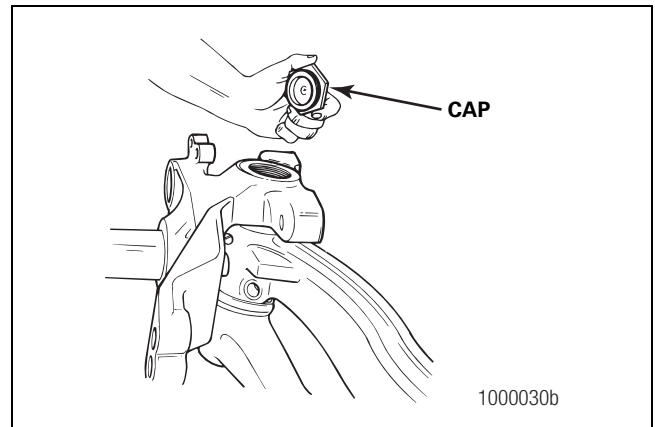
5. Remove the tie rod arms from the knuckle. If necessary tap on the end of the arm with a leather or plastic mallet to separate the arm from the knuckle. Keep these parts for reuse.
6. If necessary, remove the tie rod ends from the tie rod.
  - A. Mark the position where each tie rod end is installed in the tie rod. The length of the tie rod and the position of the tie rod ends determines wheel toe-in.
  - B. Remove the bolts and nuts from the clamp on the tie rod.
  - C. Remove the tie rod ends from the tie rod.



**Figure 14**

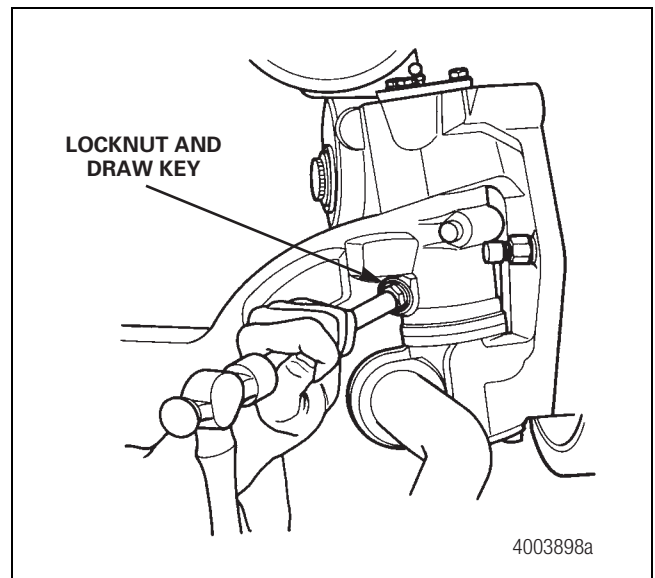
## Remove the Threaded King Pin Caps, Draw Keys, King Pin and Knuckle

1. Remove the top and bottom king pin caps. Figure 15.

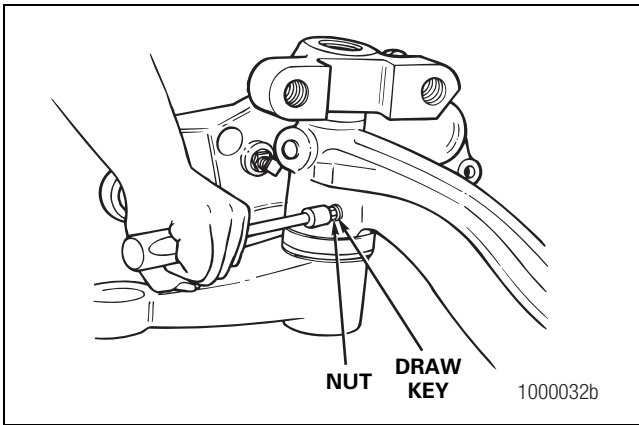


**Figure 15**

2. Use the following procedure to remove the upper and lower draw keys from the knuckle.
  - A. Loosen the draw key nut. Use a brass drift and a hammer to hit the end of the draw key. Figure 16.
  - B. Remove the nut from the draw key. Figure 17. Remove the draw key from the knuckle.

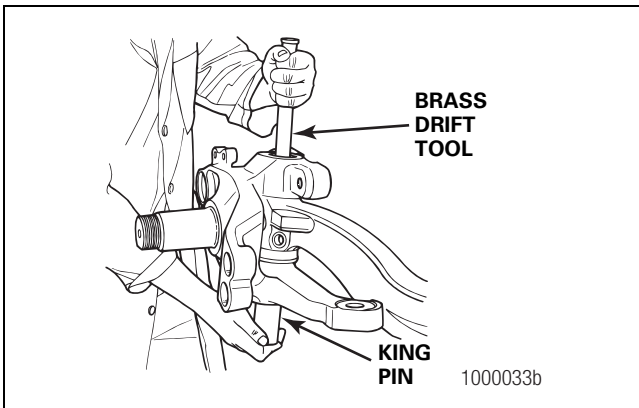


**Figure 16**



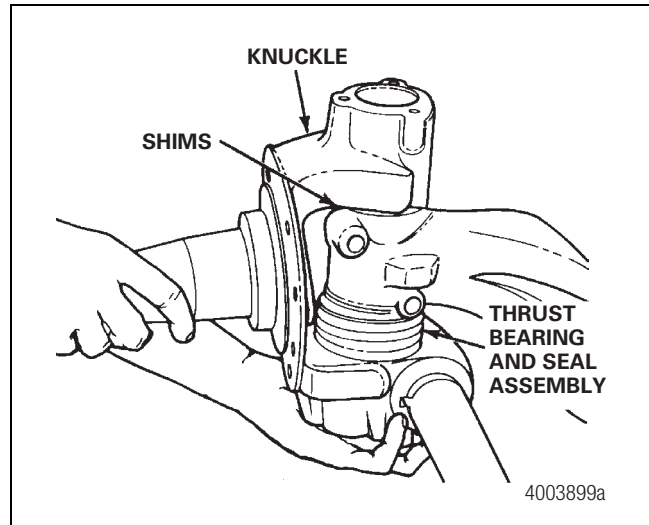
**Figure 17**

3. Use the following procedure to prevent damage to the bushings during king pin removal.
  - A. Use a hammer and brass drift to remove the king pins from the knuckle. Figure 18.
  - B. Remove any flaring on the drift that touches the bushings.
  - C. Wrap tape to a thickness of 1/16-inch (1.5 mm) onto the end of the drift.



**Figure 18**

4. Remove the king pin. Keep the part. If the king pin is hard to remove, use a hydraulic king pin remover. To obtain this tool, contact Meritor's Commercial Vehicle Aftermarket at 888-725-9355.
5. Remove the knuckle/spindle from the axle center. Discard the knuckle/spindle. Figure 19.



**Figure 19**

6. Remove the shims and thrust bearing. Keep these parts for reuse.
7. Verify the length of the stop bolt. Remove the stop bolt from the knuckle. The stop bolt will be reused on the replacement knuckle.
8. Remove and discard the torque plate. Keep the fasteners for reuse.

## Assembly and Installation Procedures

In this section, the conventional bearing components will be assembled. This will include replacement knuckles/spindles, torque plates, hubs and rotors, bearings, spindle nut packs and hub covers.

### Install the Inner Knuckle Bushing Seal

1. Place the knuckle in a vise with brass jaws so that the jaws hold the top of the knuckle. The bottom of the knuckle must be toward you.
2. Place the seal into the bottom of the top knuckle bore. Verify that the open V-lip of the seal is away from the bushing to allow grease to purge. Figure 20.

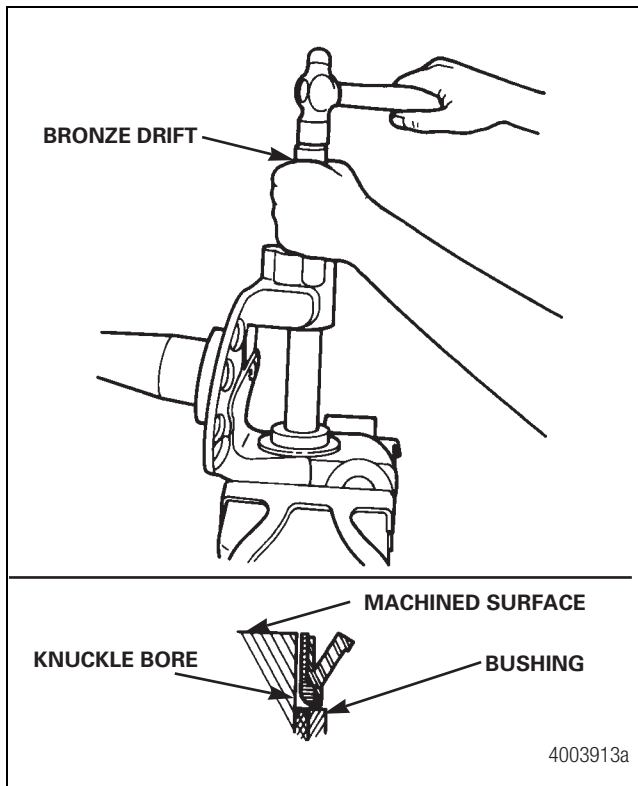


Figure 20

### **⚠ WARNING**

Use a brass or synthetic mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off. Serious personal injury and damage to components can result.

3. Use a brass drift, hammer and correct size driver or socket to install the seal. Install the seal until the top of the seal is even with the machined surface of the knuckle. Figure 20.
4. Turn the knuckle over into the vise. The jaws of the vise must hold the bottom of the knuckle. The top of the knuckle must be toward you.

5. Place the seal in the top of the bottom knuckle bore. Verify that the lip of the seal is away from the bore.
6. Repeat Step 3 of this procedure.

### Install the Knuckle

1. Clean the knuckle bores and axle center.
2. Place the knuckle onto the axle center.
3. Thoroughly pack the thrust bearing rollers with grease.
4. Prior to installation, locate the top of the thrust bearing assembly. The thrust bearing assembly must be installed with the correct orientation as follows. Figure 21.

**NOTE:** The thrust bearings have the seal integrated with the bearing assembly.

- The surface with the inner diameter seal must be on top.
- The surface with the outer diameter lip seal must be on the bottom.

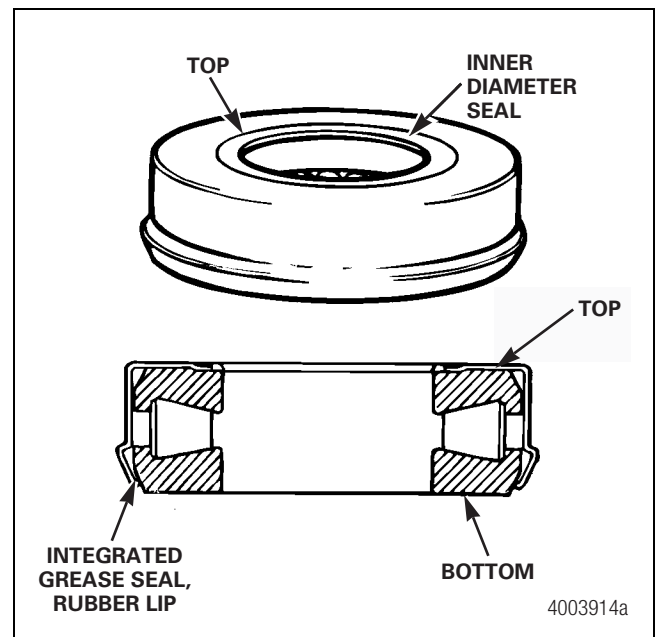


Figure 21

5. Slide the seal and thrust bearing assembly between the bottom of the axle center and knuckle. Verify that the seal is toward the axle center and over the thrust bearing. Figure 22.

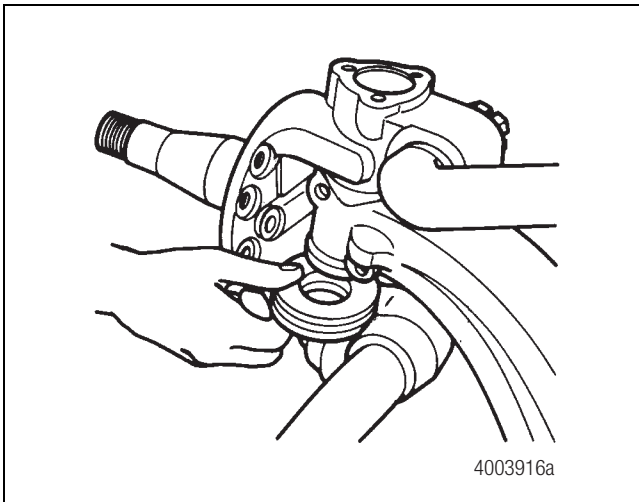


Figure 22

**⚠ WARNING**

**Wear gloves when holding shims. Shims have sharp edges and can cause serious personal injury.**

6. Install the shims.
  - A. Inspect the shims. Replace any damaged shims.
  - B. If a new shim pack must be determined, select the amount of shims that will give the least end play: 0.001-inch minimum to 0.010-inch maximum. (0.025-0.254 mm).
  - C. Place a pry bar between the steering arm boss and the axle beam. Lift the knuckle and slide the shim pack between the top of the axle center and the knuckle. Figure 23.

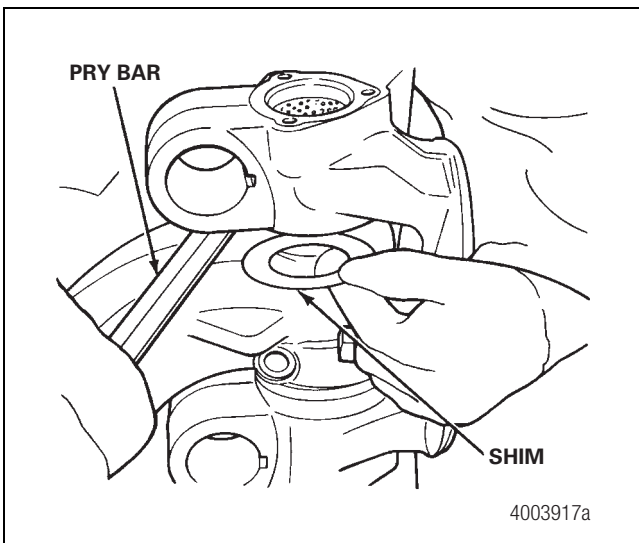


Figure 23

- D. Verify that the bores of the knuckle, axle center, shims, seals and thrust bearing are aligned. If these parts are not aligned, parts will be damaged when the king pin is installed.
  - E. Remove the pry bar.
7. Install the king pin. Figure 24.

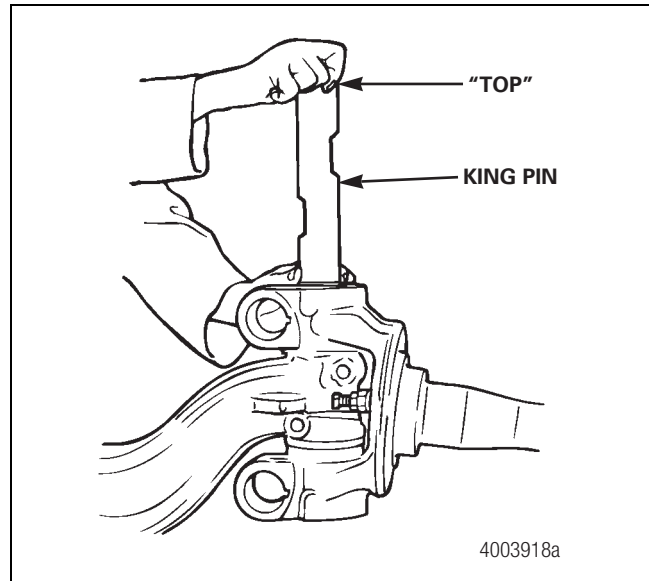


Figure 24

- A. Apply a specified lubricant to the bottom half of the king pin.
- B. Install the king pin in the top of the knuckle. Verify that the word "TOP" that is stamped on the king pin is toward you.
- C. Rotate the king pin so that the draw key slots in the pin are aligned with the holes in the axle center.

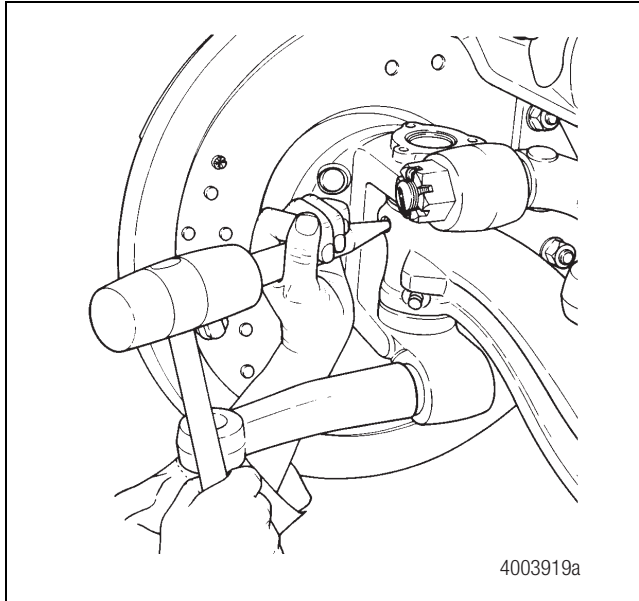
**⚠ CAUTION**

**Do not force the pin through the top bushing. The shims will be damaged.**


- D. Push the king pin through the top bushing, bushing seal and shim pack. If the king pin is difficult to install, verify that all the parts are aligned.
- E. After the king pin is through the shim pack, push the king pin into the bottom bushing. If necessary, use a brass hammer to drive the king pin into the bushing. Verify that the axle center, spindle and thrust bearing and bushing seal are aligned.
- F. Verify that the draw key slots in the pin are aligned with the holes in the axle center.

**NOTE:** Do not drive the draw keys into the knuckle until after the end play is checked and adjusted.

8. Install the upper draw key with the nut to the front of the axle. Install the lower draw key with the nut to the rear of the axle. Verify that the key is aligned with the slot in the pin. Seat both draw keys with a hammer. Figure 25.



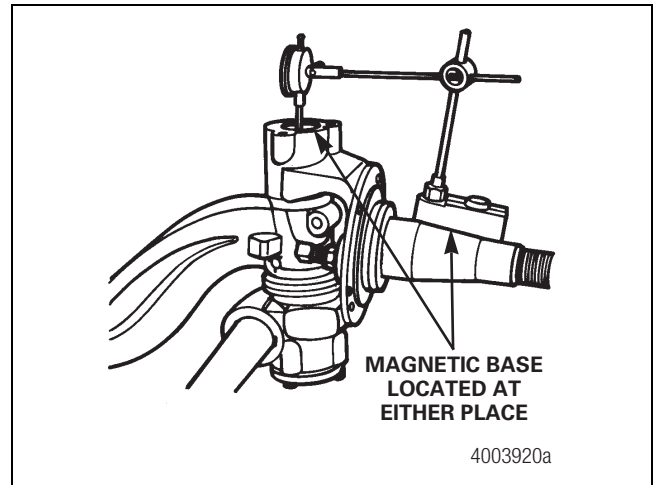
**Figure 25**

9. Rotate the knuckle in both directions to ensure it moves freely.
10. Use an impact gun to tighten the draw key nuts to 30-55 lb-ft (41-75 N•m). 
11. Check the knuckle end play. Refer to the procedure in this section.

## Check the Knuckle End Play

### Wheel Removed from the Spindle

1. Hit the top boss of the knuckle with a rubber mallet to move all parts into position.
2. Turn the knuckle to the straight or forward position.
3. Attach a dial indicator. Place the base of the indicator onto the knuckle assembly. Place the tip of the indicator onto the center of the king pin. Place the dial indicator on the ZERO position. Figure 26.

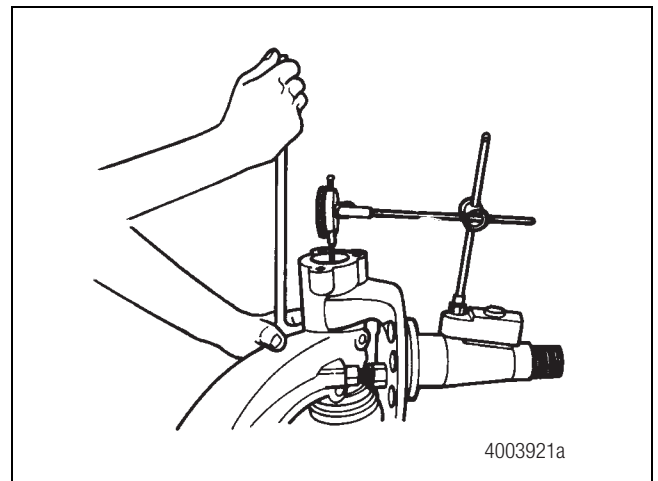


**Figure 26**

### WARNING

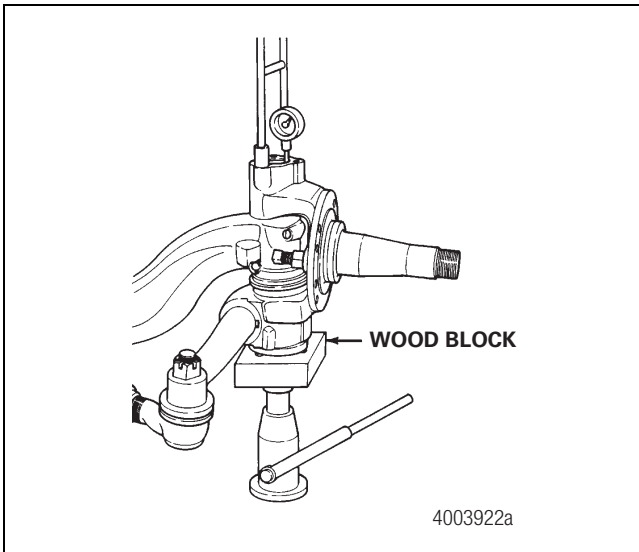
If a hydraulic jack is used to measure end play, use safety stands to support the axle. If safety stands are not used, the axle can fall and cause serious personal injury.

4. Use one of the following procedures to measure end play.
  - Place the pry bar between the knuckle and the top of the axle center. Pull the knuckle upward and measure the end play. Figure 27.
  - Place a block of wood and hydraulic jack under the bottom of the knuckle. Raise the knuckle until the pointer on the dial indicator stops. Figure 28.



**Figure 27**



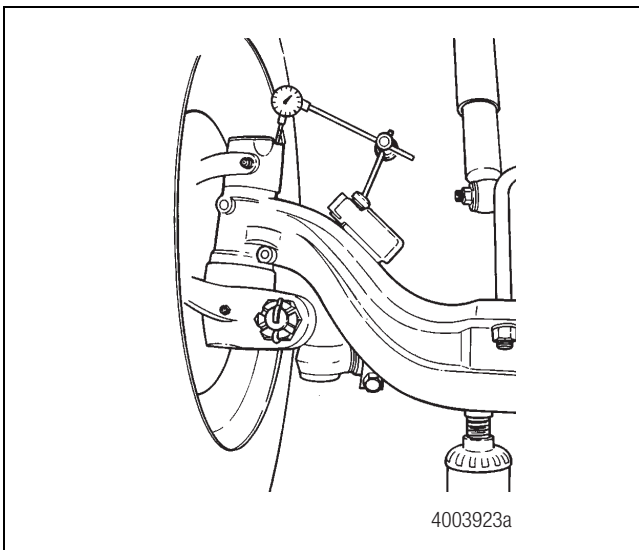


**Figure 28**

5. Repeat Steps 3-4 with the axle in the full right turn and full left turn positions.
6. End play must measure 0.001-0.025-inch (0.025-0.635 mm) in all axle positions.
  - **If the knuckle binds or ZERO end play is measured:** Remove shims from the shim pack.
  - **If more than 0.025-inch (0.635 mm) end play is measured:** Add shims to the shim pack.

#### Wheel Installed on the Spindle

1. Install a dial indicator. Verify that the base of indicator is on the axle center. Verify that the tip of the indicator is on the center of the knuckle cap. The tip of the indicator can also be placed onto the knuckle. Figure 29.



**Figure 29**

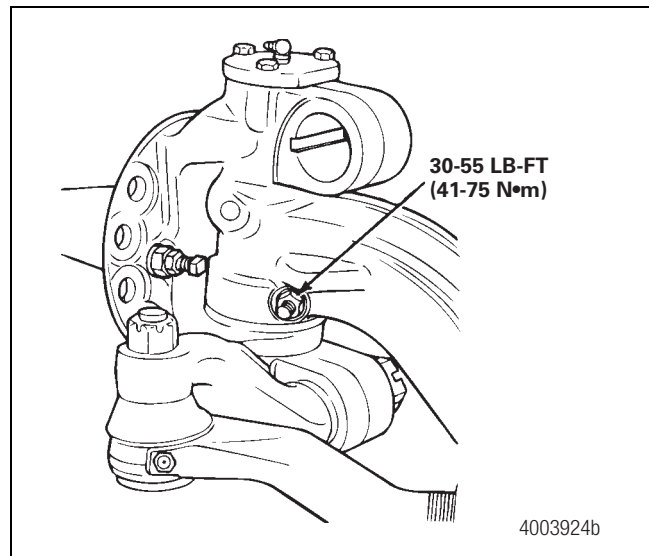
2. Use a lever to lift the knuckle to measure the end play.
3. End play should measure 0.001-0.010-inch (0.025-0.254 mm) maximum on both knuckles.
  - **If the knuckle is binding or ZERO end play is measured:** Remove shims from the shim pack.
  - **If more than 0.010-inch (0.254 mm) end play is measured:** Add shims to the shim pack.

#### Install the Draw Key Locknuts and King Pin Caps

##### **⚠ CAUTION**

Verify that the draw key is installed completely and the locknut is tightened to the specified torque. If the draw key is not installed correctly, the king pin and the axle center will be damaged.

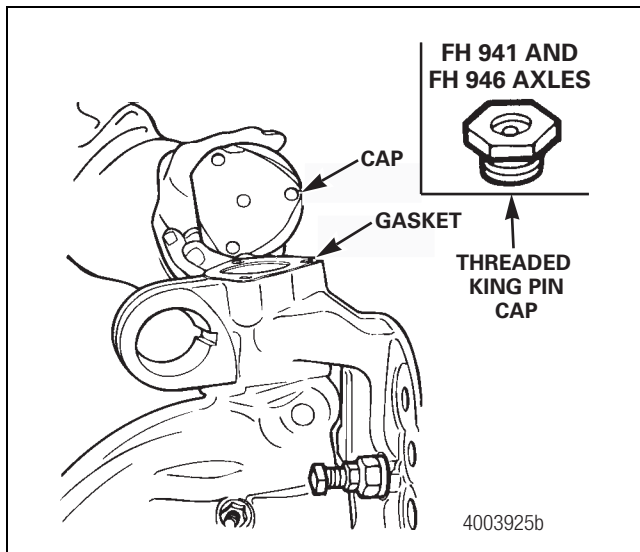
1. Install the locknut on the threaded draw keys and tighten to 30-55 lb-ft (41-75 N•m). Figure 30. **ⓘ**



**Figure 30**

2. For FH 941 and FH 946 axles, apply sealant 360 degrees around the first thread of the king pin cap and install the top and bottom threaded king pin caps. Tighten to 100-120 lb-ft (135-160 N•m). Figure 31. **ⓘ**





**Figure 31**

### Install the Tie Rod Arms and Steering Arms

1. Install the key in the slot at the tapered end of the arm. Press the key into slot. Do not mix the arm key and slot types.
  - For a square key, position flush to the shoulder of the arm taper.
  - For a woodruff key, position in the slot provided.
2. Install the tie rod arm in the knuckle.

#### **CAUTION**

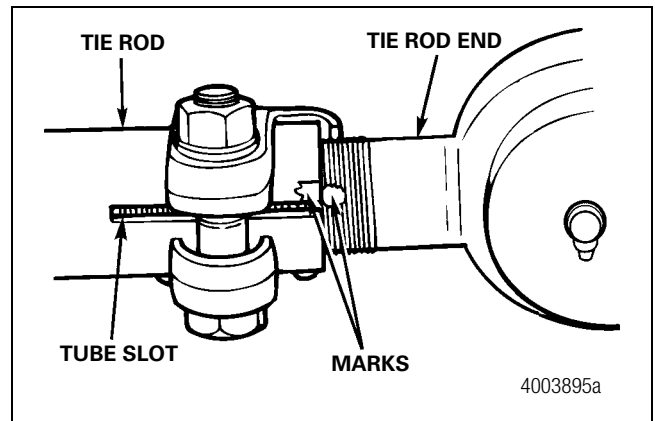
**Tighten the tie rod arm nuts to the specified torque. If the nuts are not tightened to the specified torque, the tie rod arm, Pitman arm or knuckle will be damaged.**

3. Install the nut that fastens the tie rod arm to the knuckle. Tighten the nut to 775-1050 lb-ft (1051-1424 N•m) and up to 1450 lb-ft (1965 N•m) to align the cotter pin.
4. Install the cotter pins. 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. Check and, if necessary, adjust toe-in. Refer to the procedures in this publication.

### Install the Tie Rod Assembly and Tie Rod Ends

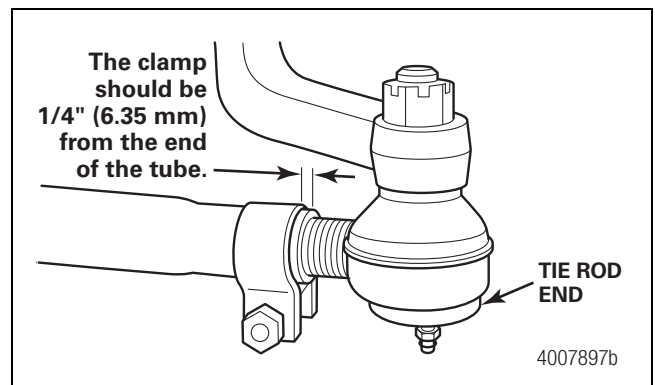
The tie rod has right-hand threads on one end and left-hand threads on other end. Verify that the correct tie rod ends are installed on the tie rod.

1. If removed, install the tie rod ends on the tie rod. Install the tie rod ends to the position marked during removal. Figure 32.
  - **If new tie rod ends are installed:** Thread the tie rod ends equally on each side of the tie rod to the overall required length.



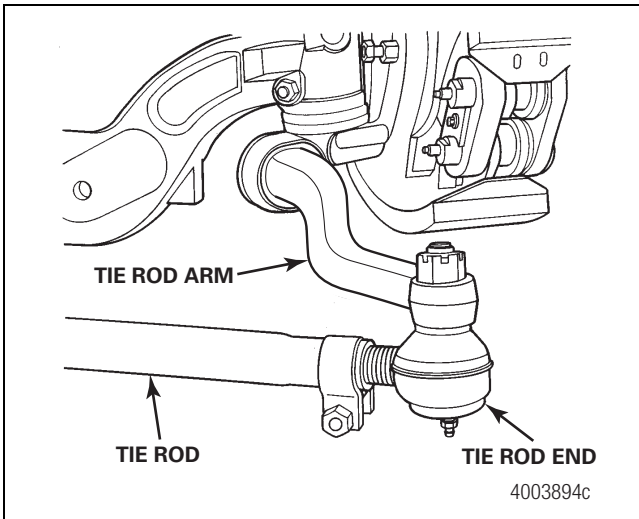
**Figure 32**

2. Install the nuts and bolts in the clamps on the tie rod. The clamps should be positioned 1/4-inch (6.35 mm) from the end of the tie rod tube. Tighten the nuts and bolts. Figure 33.
  - For a 5/8"-11 clamp bolt on a tie rod tube up to 1.75-inches in diameter: 40-60 lb-ft (55-81 N•m). **T**
  - For a 5/8"-11 clamp bolt on a tie rod tube 2-2.5-inches in diameter: 80-90 lb-ft (109-122 N•m). **T**
  - For a 3/4"-10 clamp bolt: 155-175 lb-ft (210-237 N•m). **T**



**Figure 33**

3. Clean and dry the tie rod end taper and the tie rod arm tapered hole.
4. Connect the tie rod ends into the tie rod arms on the knuckle.
5. Install the nuts that fasten the tie rod ends to the tie rod arms. Tighten the nuts to 160-215 lb-ft (217-292 N•m) and up to 320 lb-ft (434 N•m) to align the cotter pin. Figure 34. **T**



**Figure 34**

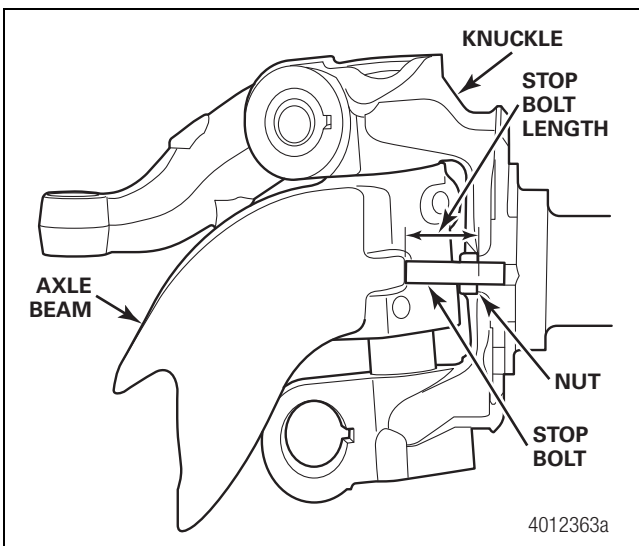
6. Install the cotter pins. If the holes are not aligned, tighten the nut to the next hole in the nut. Do not loosen the nut to install the cotter pin.
7. Check and, if necessary, adjust toe-in. Refer to the procedures in this publication.

### Adjust the Steering Stop

#### **CAUTION**

In power steering systems, the hydraulic pressure should relieve or “drop off” at the end of the steering stroke (with 0.125-inch or 3 mm minimum clearance at the stop bolt). If the pressure does not relieve, the components of the front axle will be damaged.

Return the stop bolt to the original setting. Stop bolt length is shown in Figure 35.



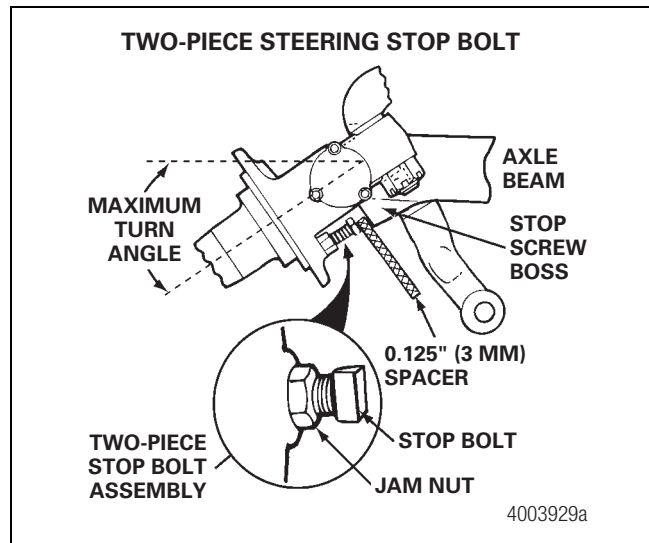
**Figure 35**

**Table I: Original Stop Bolt Setting**

Axle	Turn Angle	Stand Out Length
FH941	MTA-51	L=1.906***
FH946	MTA-12	L=TBD*

\*Re-use the stop bolt. Verify the length prior to removal from the unitized wheel-end knuckle.

For power steering systems, the stop bolt must not touch the beam. The stop bolt must always have a minimum clearance of 0.125-inch (3 mm). Figure 36.



**Figure 36**

For manual steering systems, Meritor recommends a stop bolt clearance of 0.125-inch (3 mm). Stop bolt contact is acceptable if no other stops are used for the maximum turn angle of the steering knuckle. Figure 36.

1. Place a 0.125-inch (3 mm) spacer between the stop bolt and the boss on the axle beam.
2. Turn the steering wheel until the boss on the axle beam touches the spacer in front of the stop bolt. Measure the turn angle. Figure 36.
3. If the maximum turn angle does not meet vehicle manufacturer's specifications, correct the maximum angle. In a power steering system, adjust the pressure relief. In a manual steering system, follow guidelines and specifications from the vehicle manufacturer.
4. When the maximum turn angle is correct, loosen the stop bolt jam nut. Figure 36. Insert a 0.125-inch (3 mm) spacer and adjust the stop bolt. Tighten the jam nut to 65-85 lb-ft (68-101 N•m).

## Adjust the Pressure Relief in the Power Steering System (Setting Maximum Turn Angle)

The pressure relief in the power steering system stops or reduces forces applied to the axle when the wheel is moved in the full turn position.

Check the pressure relief if the steering arm is damaged or the power steering gear is serviced.

Two types of systems are used to adjust the pressure relief.

- Mechanical stop on the Pitman arm or in the assist cylinder
- Hydraulic pressure relief in the power steering gear

## Install the ABS Sensor

**NOTE:** The new replacement knuckles and spindles should already have the ABS bushings pre-installed. The ABS bushing should have a 0.87-inch (22 mm) standoff from the knuckle flange face.

1. Apply a light coat of grease to the bore of the ABS bushing.
2. Squeeze the spring clip and install it into the ABS bushing from the inside face. Ensure that the tabs are bottomed out. Figure 37.

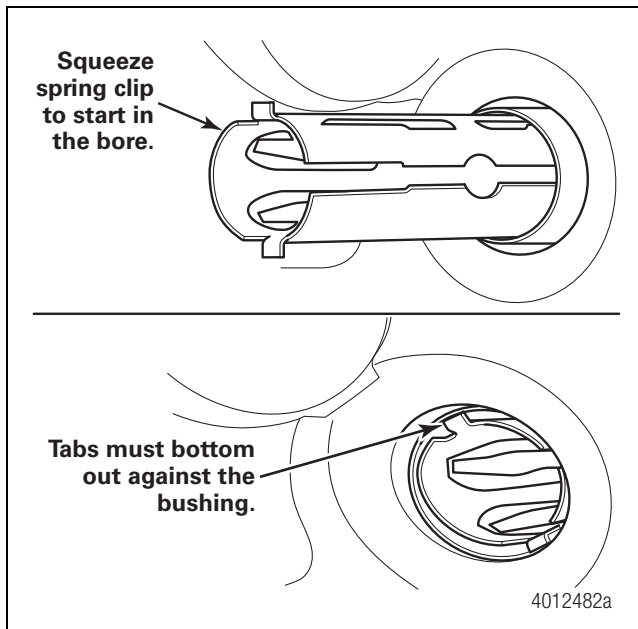


Figure 37

3. Grease the inside diameter of the spring clip and ABS sensor body. Push the ABS sensor in until it bottoms out.

## Install the Torque Plate to the Knuckle Assembly

1. Verify the LH and RH positions and orientations for each torque plate. The face with the added wing material should be to the inboard side. Figure 38.

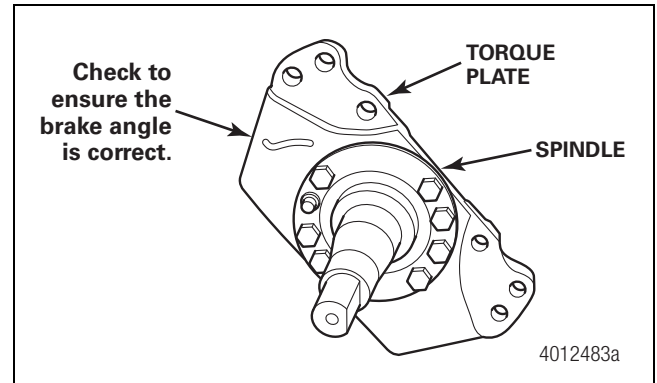


Figure 38

2. Check the brake angle for the axle specification. Refer to Table A through Table H in the Kits section of this publication for brake angle information.
3. Verify that the torque plate bolt holes and ABS holes are aligned with each other.
4. For FH941 and FH946 model axles, install the bolts from the outside face and the washers and nuts on the inside face. Tighten the nuts to 310-400 lb-ft (420-540 N•m). Figure 39.

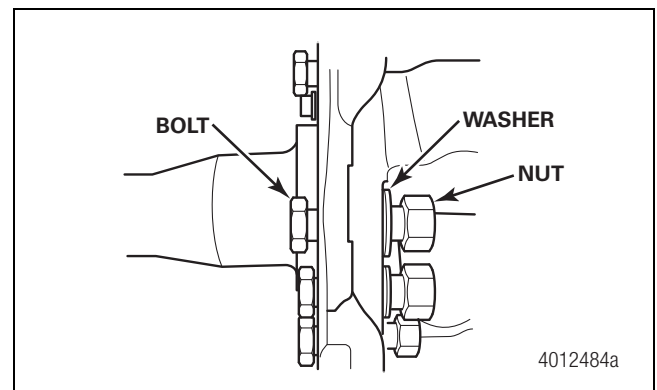


Figure 39

5. For the MC14/MC16 axles, install the bolts through both the torque plate and the spindle and into the threaded holes in the frame. Ensure that ABS sensor is installed prior to clamping the parts together. Tighten the bolts to 326-420 lb-ft (440-570 N•m).

## Install the Conventional Wheel End

### Hub Assembly Installation — Grease-Lubricated Wheel Ends

1. Lubricate both the inner and outer wheel bearings. Using a bearing grease packer or by hand, force the specified grease into the cavities between the rollers and cage.
2. Insert the inner wheel bearing into the hub bore.
3. Install a new grease/oil seal using the correct seal driver. Refer to Figure 51.
4. Carefully install the hub and rotor assembly onto the spindle. Ensure that the assembly is correctly seated.
5. Pack the hub between the bearing cups with the specified grease, up to the level of the smallest diameter of the cups 360 degrees around. Figure 40.

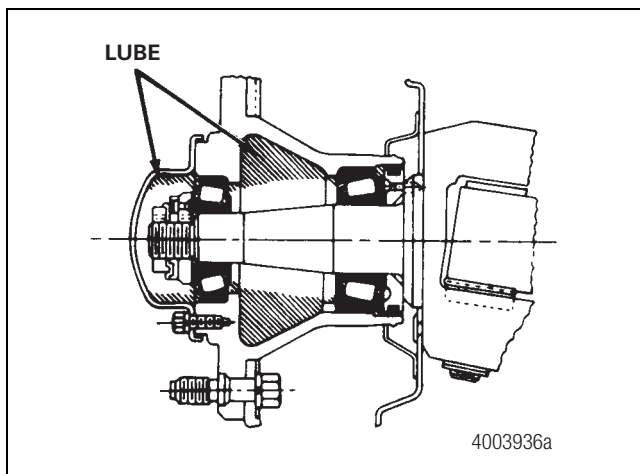




Figure 40

6. Insert the outer wheel bearing into the hub bore.
7. Adjust the wheel bearings. Refer to the wheel bearing adjustment procedure in this section.
8. Install the gasket and hubcap with the capscrews and flat washers. Tighten the capscrews to 6 lb-ft (8.13 N•m) maximum using a star pattern. Then use a star pattern to apply a final torque of 12-18 lb-ft (16-24 N•m). For models with CR Zytel hubcaps, apply a final torque of 12-16 lb-ft (16-22 N•m). 

### Hub Assembly Installation — Oil-Lubricated Wheel Ends

1. Lubricate both the inner and outer bearings with oil.
2. Insert the inner wheel bearing into the hub bore. The bearing cups must be pressed tight against the shoulder in the hubs.
3. Install a new oil seal using the correct driver. Refer to Figure 51.
4. Install the hub onto the spindle. Install the outer wheel bearing cone in the hub. Install the adjusting nut.

5. Adjust the wheel bearings. Refer to the wheel bearing adjustment procedure in this section.
6. Install the gasket and hubcap with the capscrews and flat washers. Tighten the capscrews to 6 lb-ft (8.13 N•m) maximum using a star pattern. Then use a star pattern to apply a final torque of 12-18 lb-ft (16-24 N•m). For models with CR Zytel hubcaps, apply a final torque of 12-16 lb-ft (16-22 N•m). 
7. Remove the fill plug and add the specified oil to the correct level. Reinstall the fill plug.  
**NOTE:** Approximately 21.3 ounces (630 ml) of oil is required to fill each hub.
8. Rotate the wheel end to ensure distribution of the oil.
9. Recheck the level on the cap. If the oil level is not at the specified level on the cap, remove the fill plug. Add the specified oil until the oil is at the correct level. Figure 41.

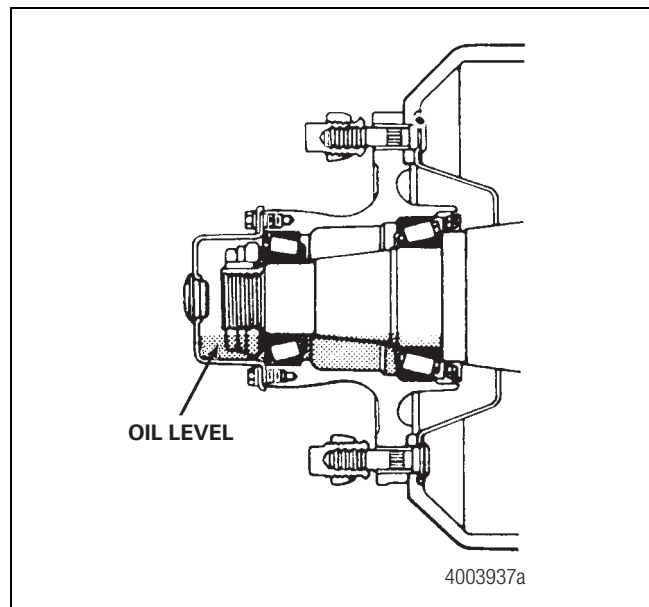





Figure 41

## Adjust the Wheel Bearings

1. Secure the hub assembly on the spindle using the outer wheel bearing adjusting nut. The adjusting nut must be installed so that the nipple faces outward toward the hubcap. Tighten finger-tight.
2. Tighten the adjusting nut to 150 lb-ft (203 N•m) while rotating the hub. Rotate the hub a minimum of five times while tightening the nut. This will ensure correct bearing-to-hub bore contact. 
3. Loosen the adjusting nut completely. Retighten to 50 lb-ft (68 N•m) while rotating the hub. 
4. Back off the outer wheel bearing adjusting nut 1/4 turn.

5. Install the D-style pierced lock ring so that it passes through the flat on the spindle. Ensure that the adjusting nut nipple engages one of the through holes on the lock ring.
6. Install the D-style lock washer so that it passes through the flat on the spindle.
7. Install the outer wheel bearing jam nut. Tighten to 200-300 lb-ft (271-407 N•m). 
8. Measure bearing end play with a dial indicator. Bearing end play should be 0.001 to 0.005-inch (0.025-0.127 mm).
9. If necessary, adjust bearing end play to obtain the correct dial indicator reading.
10. Bend one side of the D-style lock washer over the outer wheel bearing jam nut to lock it in position.

## Install the Brake Assembly

Install the disc brake caliper assembly onto the torque plate. Refer to Maintenance Manual MM-0467, EX+™ Disc Brake, for more information.

## Vehicle Checks

### Check and Adjust the Wheel Bearings

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
2. Use a jack to raise the vehicle so that the wheels to be serviced are off the ground. Support the vehicle with safety stands.
3. Remove the wheel and tire assembly from the hub. If using oil lube hubs, drain the oil from the hubcap.
4. Remove the capscrews that fasten the cap to the hub. Remove the gasket and cap.
5. Attach a dial indicator with the magnetic base at the center of the spindle. Adjust the dial indicator so that the pointer is against the hubcap gasket face. Set the dial indicator on ZERO. Figure 42.

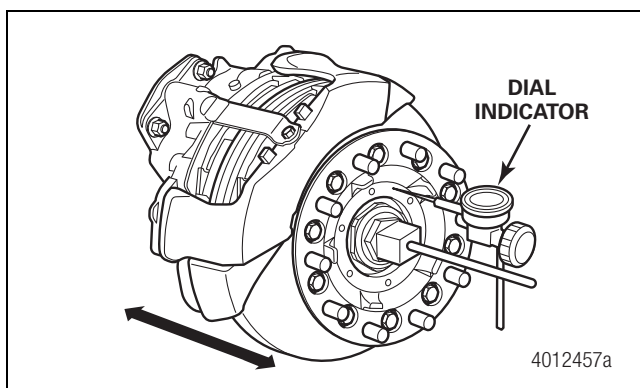




Figure 42

6. Measure the end play by pushing and pulling on each side of the hub while looking at the dial indicator. The end play is the total travel observed. Do not push or pull at the top and the bottom of the hub. Pushing or pulling at the top and the bottom will not give a true reading of the end play.
  - **If the end play is not within 0.001-0.005-inch (0.025-0.127 mm):** Adjust the wheel bearings.
7. If necessary, adjust the wheel bearings according to the procedure in Step 11.
8. Bend the lock washer off the flats of the jam nut. Remove the jam nut, jam nut washer and pierced lock ring.

## WARNING

When performing a wheel bearing adjustment:

- Always use the correct size wrench socket.
  - Always use a torque wrench to tighten the adjusting nuts to their correct adjusting torques.
  - Never attempt to tighten or loosen the adjusting nuts by either hitting them directly with a hammer or by hitting a chisel or a drift placed against them with a hammer. Failure to do this can damage the nuts, prevent a correct wheel bearing adjustment from being achieved, and cause possible loss of vehicle wheel-end equipment and serious personal injury.
9. Use the torque wrench to tighten the adjusting nut to 150 lb-ft (203 N•m) while rotating the hub in both directions. 
  10. Loosen the nut completely and then tighten the nut to 50 lb-ft (68 N•m) while rotating the hub. 
  11. Adjust the wheel bearings. Figure 43.

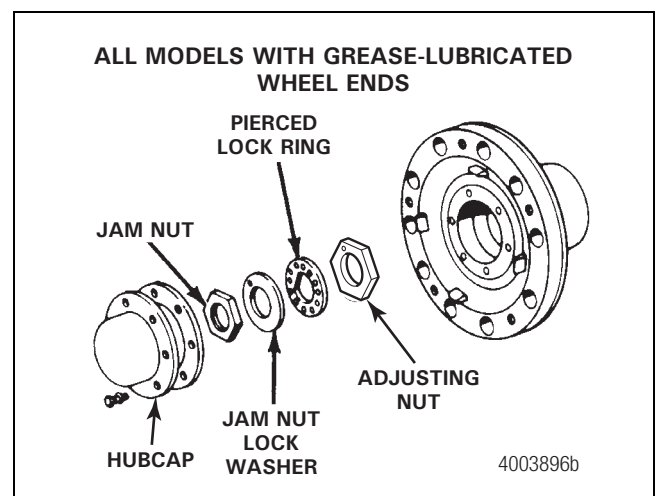




Figure 43

- A. Back off the adjusting nut 1/4 turn.

- B. Install the pierced lock ring, lock washer and jam nut.
  - C. Tighten a 1.75-inch threaded jam nut to 200-300 lb-ft (271-407 N•m). 
  - D. Measure the wheel end play to verify that the end play is 0.001-0.005-inch (0.025-0.127 mm) or Steps A-C must be repeated. If end play exceeds 0.005-inch (0.127 mm), reduce the amount the adjusting nut is backed off in Step A.
  - E. When the correct end play is achieved, lock the jam nut in place by bending the edge of the jam nut lock washer over one flat of the jam nut.
12. Measure the end play by pushing and pulling on the horizontal axis of the hub while looking at the dial indicator. The end play is the total travel observed.
    - **If the end play is not within specifications:** Adjust the wheel bearings.
  13. Install the gasket and hubcap with the capscrews and flat washers. Tighten the capscrews to 6 lb-ft (8.13 N•m) maximum using a star pattern. Then use a star pattern to apply a final torque of 12-18 lb-ft (16-24 N•m). For models with CR Zytel hubcaps, apply a final torque of 12-16 lb-ft (16-22 N•m). 
  14. Install the tire and wheel assembly.
  15. Lower the vehicle to ground. Check the brake operation.
  16. If necessary, refill the oil lube hub reservoir. Refer to the procedures in this publication.

## Adjustments

### Adjust Toe-In

#### Specification:

- Unloaded: 1/16" ± 1/32" (1.587 mm ± 0.0312 mm)
- Loaded: 1/32" ± 1/32" (0.794 mm ± 0.794 mm)

#### CAUTION

Most tire wear is caused by incorrect toe settings. Do not change camber or caster settings to correct tire wear problems. If the axle assembly is bent to change caster or camber, the strength of the axle is reduced and the warranty is voided. An axle damaged by bending can cause a vehicle accident and result in serious personal injury.

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
2. Use a jack to raise the vehicle so that the wheels to be serviced are off the ground. Support the vehicle with safety stands.

3. Use paint or chalk to mark the center area of both front tires around the complete outer surface of the tire.
4. Place the pointers of the trammel bar on the marks of each tire. Rotate tires. Verify that the straight line is marked on the outer surface of the tire.
5. Lower the vehicle to the floor. Move the vehicle forward and backward 10 feet (3 meters).
6. Place a trammel bar at back of tires. Align the pointers with the marks on the tires. Raise the pointers so that they are even with the spindles. Measure and record the distance between pointers.
7. Place a trammel bar at the front of the tires. Align the pointers with the marks on tires. Raise the pointers so they are even with the spindles. Measure and record the distance between the pointers. Figure 44.

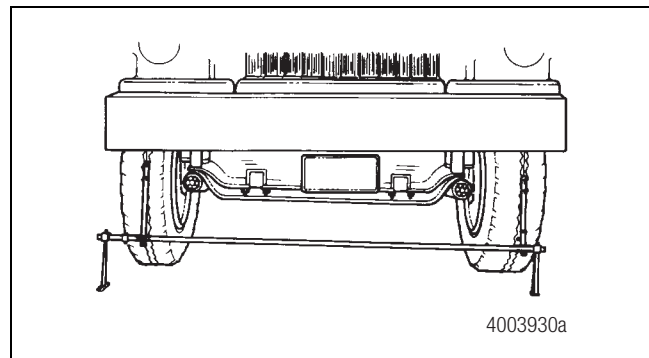


Figure 44

8. To get toe-in measurement, subtract the reading of the front of the tires from the reading at the back of the tires. Figure 45.

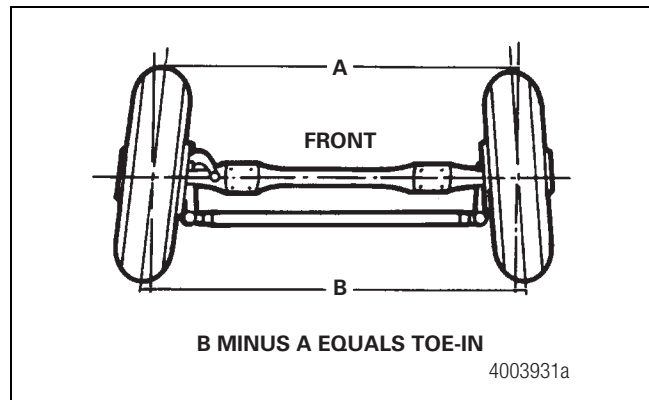




Figure 45

9. If the toe-in measurement is not at the specified distance, use the following procedure.
  - A. Loosen the nut and bolt on each end of the tie rod clamps.



- B. Turn the tie rod until the specified toe-in distance is obtained.
- C. Tighten the nut and bolt on each end of the tie rod clamp.
  - For a 5/8"-11 clamp bolt: 40-60 lb-ft (55-81 N•m). 
  - For a 3/4"-10 clamp bolt: 155-175 lb-ft (210-237 N•m). 

10. Repeat Steps 1-9 to check the toe-in dimension.

## Lubrication

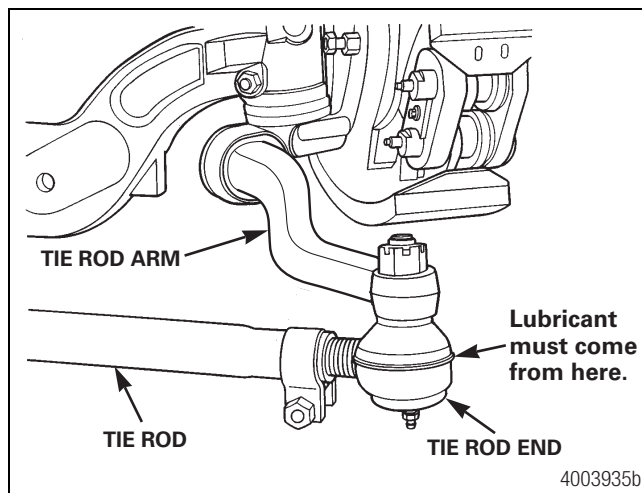
**Table J: Front Axle Lubricant Specifications**

Description	Lubricant Specification
King Pins, Bushings, Ends of Tie Rods, Ball Studs on Drag Link, Wheel Bearings	Multi-Purpose Chassis Grease, 6% 12-hydroxy lithium stearate grease, NLGI Grade 1, Meritor Specification O-617-A or equivalent
	Multi-Purpose Chassis Grease, 8% 12-hydroxy lithium stearate grease, NLGI Grade 2, Meritor Specification O-617-B or equivalent

### Lubricate the Tie Rod Ends

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

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
2. Verify that the tires touch the ground. Do not raise the vehicle.
3. Use a grease gun to lubricate the assembly. Apply the lubricant through grease fittings on assembly. Figure 46.

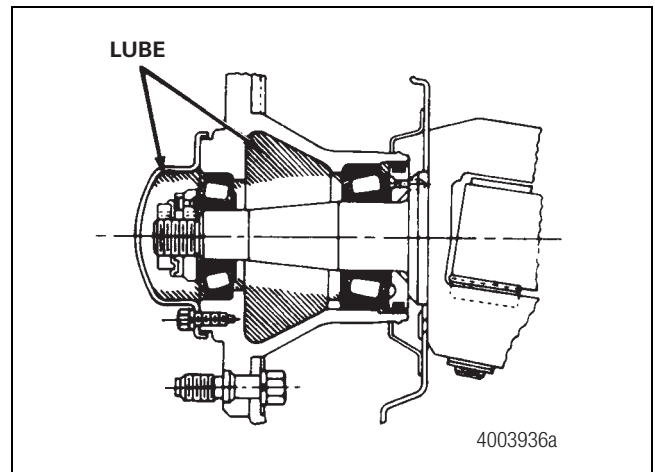


**Figure 46**

4. Apply the lubricant until new lubricant comes from the boot. Figure 46.

### Pack the Wheel End with Grease — Grease-Lubricated Wheel Bearings

1. Remove the tire and wheel assembly. Remove and disassemble the hub. Refer to the procedures in this publication.
2. Remove the old lubricant from all parts. Discard the seals. Inspect the wheel bearings for wear or damage. Replace worn or damaged bearings. Refer to the procedures in this publication.
3. Using a bearing grease packer or by hand, force the specified grease into the cavities between the rollers and cage.
4. Pack the hub between the bearing cups with the specified grease, up to the level of the smallest diameter of the cups 360 degrees around. Figure 47.



**Figure 47**

5. Install the inner and outer bearing cones into the cups in the hubs. The bearing cups must be pressed tight against the shoulder in the hubs.
6. Install new wheel seals in the hubs. Refer to the procedures in this publication.
7. Install the hub and the wheel and tire assembly. Install the outer wheel bearing cone in the hub. Install the adjusting nut.
8. Adjust the wheel bearings. Refer to the procedures in this publication.

## Fill the Wheel End with Oil — Oil-Lubricated Wheel Bearings

1. Clean and inspect the bearings for wear or damage. Replace any that are worn or damaged.
2. Remove the old lubricant from all parts. Discard the seals.
3. Lubricate and install the inner and outer bearing cones into the cups in the hubs. The bearing cups must be pressed tight against the shoulder in the hubs.
4. Install the hub and the wheel and tire assembly. Install the outer wheel bearing cone in the hub. Install the adjusting nut.
5. Adjust the wheel bearings. Refer to the procedures in this publication.
6. Install the hubcap assembly.
7. Remove the fill plug and add the specified oil to the correct level. Reinstall the fill plug.
8. Rotate the wheel end to ensure distribution of the oil.
9. Recheck the level on the cap. If the oil level is not at the specified level on the cap, remove the fill plug. Add the specified oil until the oil is at the correct level. Figure 48.

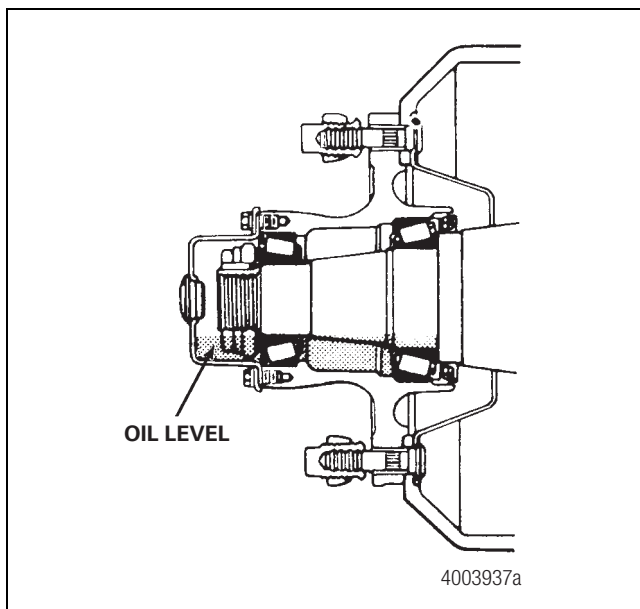


Figure 48

## Lubricate the King Pins

1. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
2. Verify that the tires touch the ground. Do not raise the vehicle. You must keep weight on the thrust bearing to better force grease through the bearing.
3. Clean off all grease fittings prior to lubrication.

4. Lubricate the pins through the grease fittings on the top and bottom of the knuckle. Figure 49.

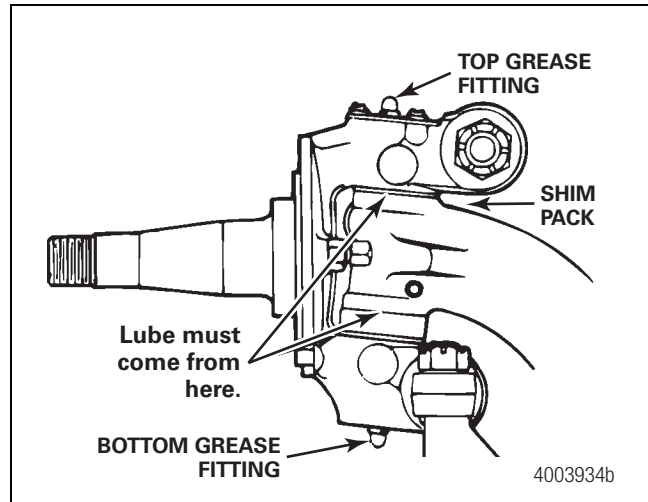


Figure 49

5. Apply lubricant until new lubricant comes from the thrust bearing upper seal and the shim pack.
  - **If grease does not purge:** The bushing seals may have been installed incorrectly. Remove and reinstall the bushing seals correctly.



# Specifications

## FH 941 and FH 946 Axles

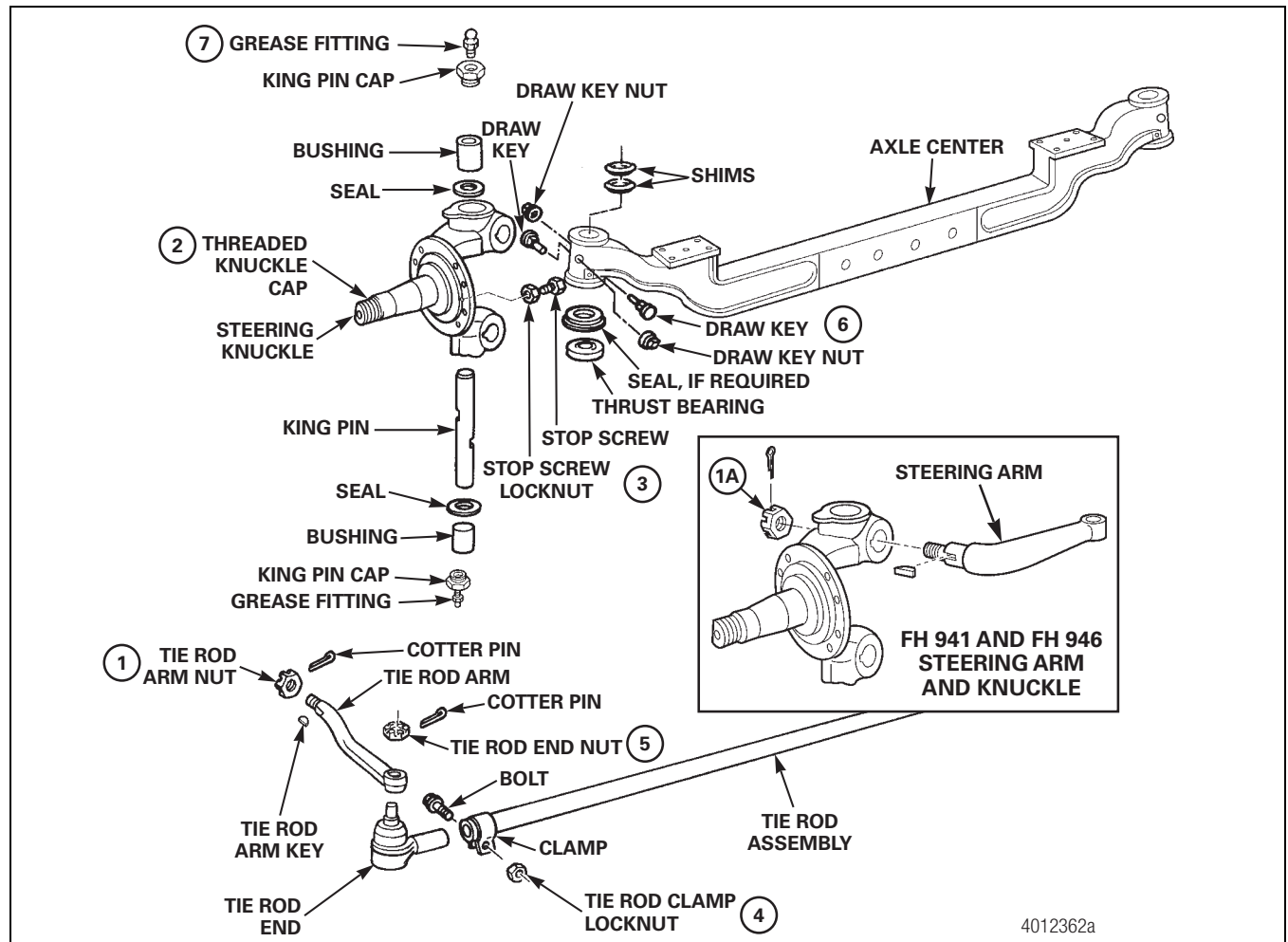


Figure 50

Table K: Fastener Torque Chart: FH 941 and FH 946 Axles

Item	Description	Size	Torque Range	
			lb-ft	N·m
1	Tie Rod Arm Nut	1-1/4"-12	775-1050 (up to 1450 maximum <sup>1</sup> )	1051-1965 (up to 1965 maximum <sup>1</sup> )
1A	Steering Arm Nut			
2	Threaded Knuckle Cap	2"-20	100-120	135-160
3	Stop Screw Locknut	1/2"-20	50-65	68-88
4	Tie Rod Clamp Locknut	5/8"-11 on Tie Rod Tube Diameters up to 1.75"	60-80	82-109
5	Standard Tie Rod End Nut	7/8"-14	160-215 (up to 320 maximum <sup>1</sup> )	217-291 (up to 433 maximum <sup>1</sup> )
6	Draw Key	7/16"-20	30-55	41-75
7	Grease Fitting	0.125"-27	10 Minimum	14 Minimum
Not shown	Hubcap Bolt <sup>2</sup>	0.375"-16	12-18	16-24
Not shown	Filler Plug		15-25	20-34

<sup>1</sup> Maximum to align the holes for the cotter pin. Refer to the tie rod cotter pin assembly procedure in this section.

<sup>2</sup> Refer to the hubcap bolt tightening procedure in this section.

## FH and MC Series Wheel-End Components

**Table L: Wheel-End Torque Specifications**

Axle Model	Bolt Joint	Fastener Size	Torque Lb-Ft	Torque N•m
FH Series	Torque Plate-to-Knuckle	0.75 x 16	310-400	420-540
MC14/MC16	Torque Plate/Spindle/Frame Flange	0.75 x 10	326-420	440-570
FH and MC Series	EX+H Carrier-to-Torque Plate Bolts	M20 x 1.5	350-450	475-610
FH and MC Series	Rotor-to-Hub Attachment	0.625-18	155-195	210-265
FH and MC Series	Hub Cap	0.375-16	12-18	16-24
FH and MC Series	Hub Cap Filler Plug	—	15-25	20-34

\* Tighten bolts in a star pattern, repeat pattern to verify. Re-check torques every 30,000 miles, or before.

\*\* Assemble PRO-TORQ™ nut with anti-seize compound on the threads.

**Table M: FH and MC Series Axles — Conventional Wheel-End System Torque Specifications**

Axle	Initial Adjusting Nut Torque <sup>1</sup>	Final Adjusting Nut Torque <sup>2</sup>	Spindle Thread Diameter	Jam Nut Torque Specification	Acceptable End Play Range <sup>2</sup>
<b>Front non-drive steer axles</b>	150 lb-ft (203 N•m) Back off 1 turn	50 lb-ft (68 N•m) Back off 1/4 turn for 1-3/4" (44.45 mm) and over	Over 1-1/8" (28.6 mm), less than 2-5/8" (66.67 mm)	200-300 lb-ft (272-408 N•m)	0.001"-0.005" (0.025-0.127 mm)

**NOTE:** For disc brake wheel ends, back off the brake caliper until the rotor is clear from the pad linings about 1/16-inch (1.588 mm) gap or more. Refer to Maintenance Manual MM-0467, EX+™ Air Disc Brake, for more information. To obtain this publication, visit Literature on Demand at meritor.com.

<sup>1</sup> Rotate the hub a minimum of five complete turns while tightening the nut.

<sup>2</sup> The nut may need to be slightly tightened or loosened to meet the required end play.

## Appendix

**Table N: Wheel-End Oil Change Intervals and Specifications**

On-Highway Operation Intervals					Outside Temperature			
Check Oil Level	Petroleum Oil Change	Meritor Specifications	Military Specification	Oil Description	°F		°C	
					Min.	Max.	Min.	Max.
1,000 miles (1600 km)	Whichever comes first:	0-76A Gear Oil	MIL-L-2105-D	GL-5, SAE 85W/140	10	None	12	None
		0-76D Gear Oil		GL-5, SAE 80W/90	-15	None	-26	None
	Seals replaced	0-76E Gear Oil		GL-5, SAE 75W/90	-40	None	-40	None
	Brakes relined	0-76J Gear Oil		GL-5, SAE 75W	-40	36	-40	2
30,000 miles (48 280 km)	Twice a year	Heavy-Duty Engine Oil	MIL-L-2104-B, -C, -D or -E	A.P.I. -CD, -CE, -SF or -SG SAE 40 or 50 <sup>1</sup>	10	None	12	None
		Heavy-Duty Engine Oil		MIL-L-2104-B, -C, -D or -E	A.P.I. -CD, -CE, -SG, -SH or -SJ SAE 30 <sup>2</sup>	-15	None	-26

<sup>1</sup> Current designations are acceptable. Multi-grade engine oils are acceptable if the SAE rating ends in 40 or 50.

<sup>2</sup> Current designations are acceptable. Multi-grade engine oils are acceptable if the SAE rating ends in 30.

**Table O: Front Non-Drive Axle Inspection and Greasing Intervals and Specifications**

<b>Component</b>	<b>Interval</b>	<b>Grease</b>	<b>Meritor Specification</b>	<b>NLGI Grade</b>	<b>Grease Type</b>	<b>Outside Temperature</b>
King Pins and Bushings	Grease every 50,000 miles (80 000 km) or once a year, whichever comes first	ECL <sup>1</sup> TEK-678 or Multi-Purpose Grease	0-704 or 0-617-A	2 or 1	Lithium 12 Hydroxystearate, Calcium Sulphonate Complex or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.
Ball Studs on Steering Arm, Tie Rod Ends, and Drag Link <sup>2</sup>	Inspect every 50,000 miles (80 000 km) or once a year, whichever comes first	—	—	—	—	—
Non-greasable Perma-Lube Tie Rod Ends	Grease whenever service is performed	ECL <sup>1</sup> TEK-678	0-704 (preferred)	2	Calcium Sulphonate Complex	-40/+150° C

<sup>1</sup> Meritor standard grease is now available from Engineered Custom Lubricants, 45800 Mast Street, Plymouth, MI 48170, 866-836-3871, [www.ecllube.com](http://www.ecllube.com).  
<sup>2</sup> Applies to ball studs on Easy Steer Plus™ axles. Sealed axles require inspection of the boot on the ball stud every 100,000 miles (160 000 km) for wear and damage. Service as necessary.

## Special Tools

<b>Description</b>	<b>Kent-Moore Tool Number<sup>1</sup></b>	<b>Owatonna Tool Number<sup>2</sup></b>	<b>Snap-On® Tool Number<sup>3</sup></b>
King Pin Remover	J 36136	4240	20 Ton: CG430HYB 35 Ton: CG730HY

<sup>1</sup> Obtain Kent-Moore tools from: SPX Service Solutions, 28635 Mound Road, Warren, MI 48092, Phone 866-621-2128, [www.servicesolutions.spx.com](http://www.servicesolutions.spx.com)  
<sup>2</sup> Obtain Owatonna tools from OTC Toll and Equipment Division, 655 Eisenhower Drive, Owatonna, MN 55060.  
<sup>3</sup> Refer to your local Snap-On® dealer.

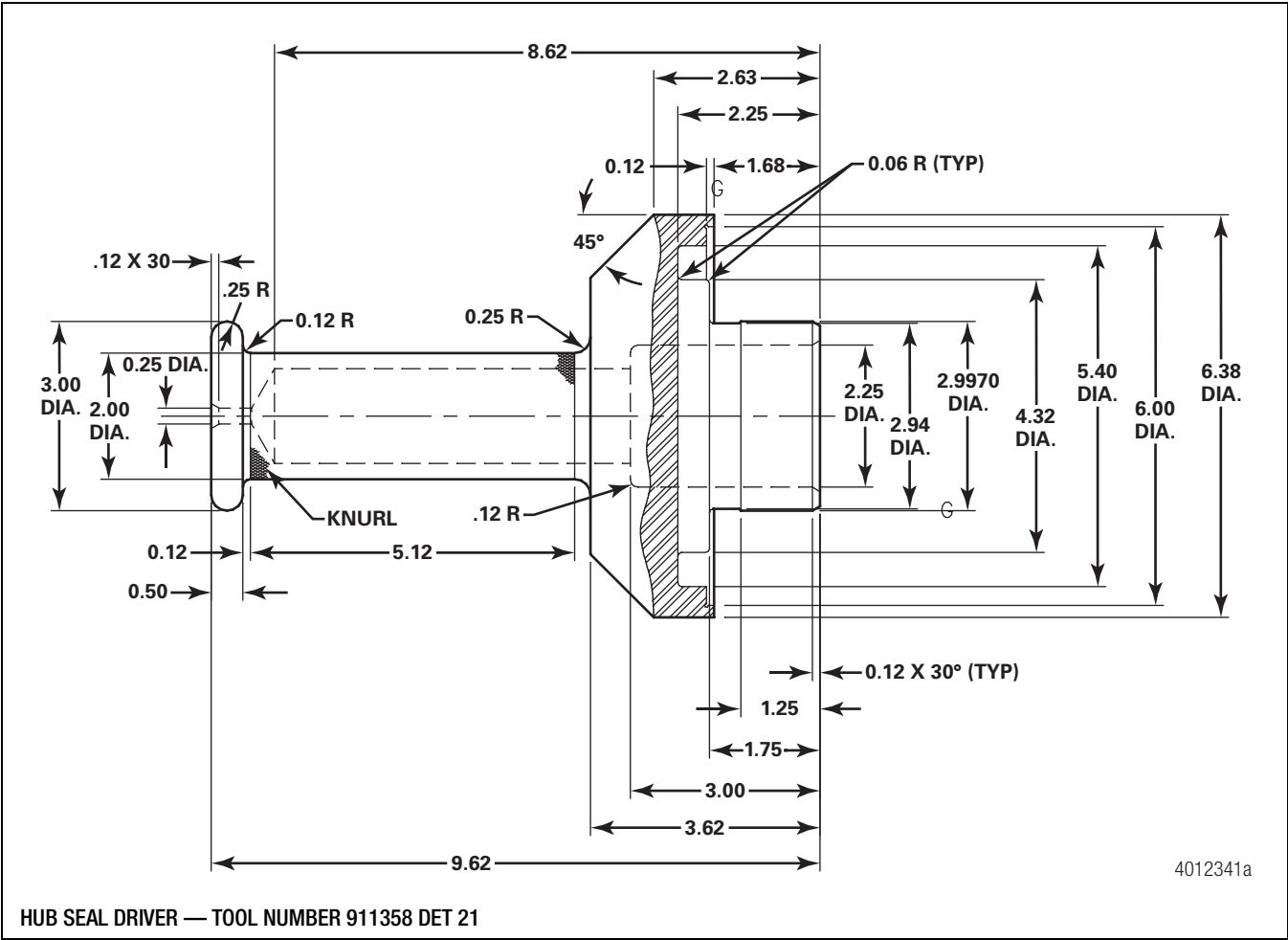


Figure 51



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