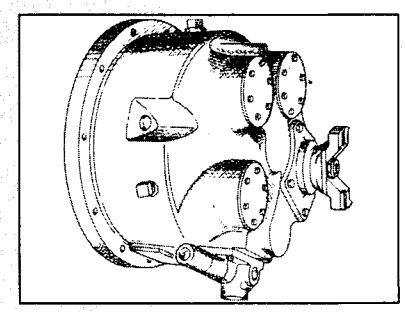
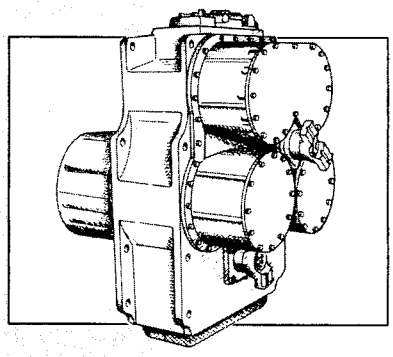
Maintenance and Service Manual

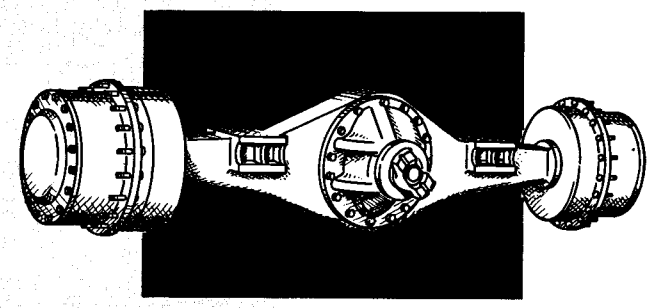


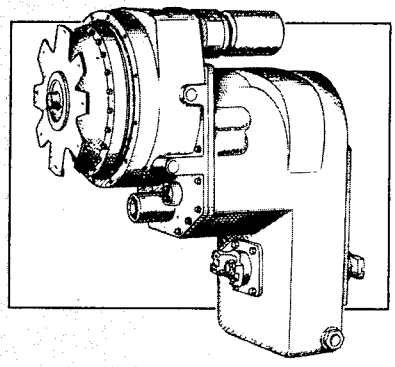
Drive Axle



Wheel Bearing Adjustment

SUPPLEMENT





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AXLE WHEEL BEARING ADJUSTMENT

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***NOTE:** Lock plate screws are of a self-locking type (orange) locking compound on threads. Use only one time, then replace or thoroughly clean used screws and apply either LOCTITE 262 (Hi strength) or LOCTITE 242 (Medium strength). Internal gear hub threads must also be cleaned when replacing screws.

DRIVE AND DRIVE STEER AXLE WHEEL BEARING ADJUSTMENT PROCEDURE AXLES USING SPLINED NUT LOCK AND WHEEL BEARING ADJUSTING NUT. FOR 12 THRU 15 SERIES AXLES

1. Before wheel bearing adjustment is made, it is imperative all tapered bearing cones and cups be pressed to fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearing cups and cones. On axles with LCB brakes, release pressure before continuing. (Any brake drag will affect obtaining correct rolling torque value).
2. Coat inner face of nut, spindle threads and spindle splines with brush-applied lubricant. (Anti-Seize or Never-Seez).
3. Install splined nut lock into the internal gear hub making sure splines are fully engaged.
4. Install wheel bearing adjusting nut and tighten nut to 750 lbf·ft torque [1016 N·m] while rotating wheel hub. Shock the internal gear hub with a heavy bar while rotating wheel hub 2 to 3 times to insure seating of bearing rollers.
5. Recheck nut torque. If nut moves while retorquing to 750 lbf·ft torque [1016 N·m], repeat number 4 as many times as necessary **until 750 lbf·ft [1016 N·m] does not move nut.** Loosen the nut 1/4 to 1/2 turn and shock the wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely.
6. Using a torque wrench adaptor bar or other appropriate measuring device, determine the rolling torque of the wheel hub with the bearings in a no-load end play condition. Due to part imbalance, there will be a variation in rolling torque throughout a revolution. This value will be the "no-load rolling torque". (The no-load rolling torque value will depend upon the wheel hub seal type and brake option).
7. Tighten nut to 350 lbf·ft torque [474 N·m], then advance nut until the tangs from the splined nut lock line up with the slots in the nut.
8. Check rolling torque of wheel hub. This value must be in the specified range as shown on the bearing preload chart plus the no-load rolling torque.
9. If over the maximum preload, reduce adjusting nut torque as required to obtain the added specified range but not less than 250 lbf·ft [338 N·m] torque on nut. If this occurs, there is a severe misalignment of parts and the wheel end must be disassembled and parts checked for concentricity and or reassembled with the internal gear hub rotated to a different position and start entire procedure over again.
10. If under the minimum preload, after rotating the wheel hub 5 or more times, increase the nut torque until the preload is in the specified range with the nut lock tangs and adjusting nut slots aligned, but not more than 750 lbf·ft [1016 N·m].
11. When proper rolling torque is achieved, bend three tangs of the splined nut lock into the slots on the adjusting nut. (See page 17).

Greater than no-load rolling torque

BEARING PRELOAD CHART		
Brake Type	**New Bearings**	**Used Bearings (Bearings in use 300 Hours or More**
L.C.B.	20 to 25 lbf·ft [27 - 33 N·m]	10 to 20 lbf·ft [14 - 27 N·m]
No Brakes Dry Disc Type Drum Type	15 to 25 lbf·ft [20 - 33 N·m]	5 to 15 lbf·ft [7 - 20 N·m]

(DOUBLE NUT AND NUT LOCK)
WHEEL BEARING ADJUSTMENT PROCEDURE
FOR THE 12D, 12S, 14D, 14S AND 14T SERIES AXLES
(With drum, dry disc or no brakes).

1. Before wheel bearing adjustment is made, it is imperative all tapered bearings and bearing cups be pressed to a fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearings and cups.

2. Install inner wheel bearing adjusting nut and tighten to 500 lbf·ft torque [677 N·m]. Shock internal gear hub with a heavy bar, while rotating wheel hub two or three times.

3. Recheck inner nut torque. If nut moves, retorque to 500 lbf·ft torque [677 N·m] and repeat shocking while rotating and tightening as many times as necessary **until 500 lbf·ft [677 N·m] does not advance nut.**

4. Loosen inner nut 1/4 to 1/2 turn and shock wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely. Measure the no-load rolling torque (normally 0 to 50 lbf·ft torque) [0-68 N·m]. Retorque inner nut 100 - 150 lbf·ft [135-203 N·m]. Shock wheel hub while rotating and recheck rolling torque. See chart for new and used wheel bearing rolling torque.

5. When proper pre-load is achieved, install adjusting nut lock. Coat inner face of jam nut and spindle threads with Anti-Seize or Never-Seez lubricant and install jam nut. **NOTE:** The nut socket used to torque the jam nut should be depth controlled to prevent contact between the socket face and outer tangs of the nut lock (see page 19). This controlled depth will prevent torque from being transmitted from the socket face to the nut lock outer tangs and the possiblity of shearing the nut lock inner tang.

6. Tighten jam nut to 500 lbf·ft torque [677 N·m]. Recheck rolling torque. Rolling torque must be in the range of values shown in chart for new and used bearings.

7. If **over** the rolling torque value listed for new and used bearings, reduce the inner nut torque as required to obtain the proper rolling torque value listed.

8. If **under** the rolling torque value listed for new and used bearings after rotating the wheel hub 5 or more times, increase inner nut torque as required to obtain the proper rolling torque value listed.

9. When proper rolling torque is obtained, bend two tangs of the nut lock over the inner nut and two tangs over the jam nut. (See page 19.)

	Rolling Torque Range	Jam Nut Torque
Adjusting NEW Tapered Bearings:	7 to 12 lbf·ft torque. [10-16 N·m] Greater than "no-load rolling torque" value.	500 lbf·ft [677 N·m]
Readjusting USED Tapered Bearings:	3 to 5 lbf·ft torque [4-6 N·m]. Greater than "no-load rolling torque" value.	500 lbf·ft [677 N·m]

(LOCK PLATE AND SCREWS)
DRIVE AXLE WHEEL BEARING ADJUSTMENT PROCEDURE
FOR THE 12D AND 12S WITH PLANETARY LCB SERIES AXLES

1. Before wheel bearing adjustment is made, it is imperative all tapered bearings and bearing cups be pressed to fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearings and cups. **NOTE:** If the wheel bearing adjusting nut has an undercut on the inner diameter, the undercut must go toward the internal gear hub. Release brake pressure before continuing. (Any brake drag will affect obtaining correct rolling torque value).

2. Install washer and wheel bearing nut. Shock the internal gear hub with a heavy bar while rotating wheel hub to insure seating of bearing rollers. Tighten nut to 500 lbf·ft [677 N·m]. Rotate wheel hub 2 or 3 times and repeat shocking and rotating. Recheck nut torque. If nut moves while retorquing to 500 lbf·ft [677 N·m] repeat above procedure as many times as necessary **until 500 lbf·ft [677 N·m] does not move nut.** Loosen the nut 1/4 to 1/2 turn and shock the wheel hub until a slight bearing end play is achieved and wheel hub can rotate freely.

3. Using a torque wrench adaptor bar or other appropriate measuring device, determine the rolling torque of the wheel end with the bearings in a no load end play condition. Due to part imbalance, there will be a variation in rolling torque as the wheel hub is rotated. Record maximum value of rolling torque throughout a revolution. This value will be the "no-load rolling torque".

4. Align holes in inner brake housing with tapped holes in internal gear hub. Tighten nut to obtain a rolling torque of 7 - 12 lbf·ft [10 - 16 N·m] **over** the free rolling torque. **Advance** nut if required so that holes in lock plate line up.

5. Recheck rolling torque of wheel hub. This must be in the range of 7 - 20 lbf·ft [10 - 27 N·m] **over** the free rolling torque.

6. Apply Loctite #262 anerobic locking compound to the inner brake housing bolts. Install lock plate and bolts, tighten to 270 - 300 lbs. **INCH** [31 - 33 N·m].

7. Above procedure is for new production axle build. For service on axles with used parts follow the same procedure except minimum allowable bearing **preload** (greater than no-load rolling torque) torque can be as low as 5 lbf·ft [7 N·m]. (See page 18.)

(DOUBLE NUT AND NUT LOCK)
WHEEL BEARING ADJUSTMENT PROCEDURE
FOR THE 15D, 16D1538, 16F, 16S, 16T1035, 16T1538, AND 16T1937 SERIES AXLES
(With drum, dry disc or no brakes).

1. Before wheel bearing adjustment is made, it is imperative all tapered bearings and bearing cups be pressed to a fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearings and cups.

2. Install inner wheel bearing adjusting nut and tighten to 500 lbf·ft torque [677 N·m]. Shock internal gear hub with a heavy bar while rotating wheel hub two or three times.

3. Recheck inner nut torque. If nut moves, retorque to 500 lbf·ft torque [677 N·m] and repeat shocking while rotating and tightening as many times as necessary **until 500 lbf·ft [677 N·m] does not advance nut.**

4. Loosen inner nut 1/4 to 1/2 turn and shock the wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely. Measure the no-load rolling torque (normally 25 to 100 lbf·ft torque [34 - 135 N·m]). Retorque inner nut 150 - 200 lbf·ft [204 - 271 N·m]. Shock wheel hub while rotating and recheck rolling torque. See chart for new and used wheel bearing rolling torque.

5. When proper pre-load is achieved, install adjusting nut lock. Coat inner face of jam nut and spindle threads with Anti-Seize or Never-Seez lubricant and install jam nut. **NOTE**: The nut socket used to torque the jam nut should be depth controlled to prevent contact between the socket face and outer tangs of the nut lock (see page 19). This controlled depth will prevent torque from being transmitted from the socket face to the nut lock outer tangs and the possiblity of shearing the nut lock inner tang.

6. Tighten jam nut to 500 lbf·ft torque [677 N·m]. Recheck rolling torque. Rolling torque must be in the range of values shown in chart for new and used bearings.

7. If **over** the rolling torque value listed for new and used bearings, reduce the inner nut torque as required to obtain the proper rolling torque value listed.

8. If **under** the rolling torque value listed for new and used bearings after rotating the wheel hub 5 or more times, increase inner nut torque as required to obtain the proper rolling torque value listed.

9. When proper rolling torque is obtained, bend two tangs of the nut lock over the inner nut and two tangs over the jam nut. (See page 19.)

	Rolling Torque Range	Jam Nut Torque
Adjusting NEW Tapered Bearings:	7 to 12 lbf·ft torque. [10 - 16 N·m] greater than "no-load rolling torque" value.	500 lbf·ft [677 N·m]
Readjusting USED Tapered Bearings: (Bearings in use 300 hours or more.)	3 to 5 lbf·ft torque. [4 - 6 N·m] Greater than "no-load rolling torque" value.	500 lbf·ft [677 N·m]

(SINGLE NUT AND LOCK PLATE)
WHEEL BEARING ADJUSTMENT PROCEDURE
FOR THE 16D2149, 16S2149, 16T2149, 19D2748 SERIES AXLES

1. Before wheel bearing adjustment is made, it is imperative all tapered bearing cones and cups be pressed to fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearing cups and cones. **NOTE:** If the wheel bearing adjusting nut has an undercut on the inner diameter, the undercut must go toward the internal gear hub. On axles with LCB brakes, release pressure before continuing (any brake drag will affect obtaining correct rolling torque value.)
2. Coat inner face of nut, spindle threads and spindle splines with brush-applied lubricant. (Anti-Seize or Never-Seez).
3. Install spindle nut and tighten to 1000 lbf·ft [1356 N·m] torque. Shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times. Recheck nut torque - if nut moves, retorque to 1000 lbf·ft [1356 N·m] and **repeat shocking while rotating and tightening** as many times as necessary **until 1000 lbf·ft [1356 N·m] does not advance nut.** Loosen 1/4 to 1/2 turn and shock the wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely.
4. Using a torque wrench adaptor bar or other appropriate measuring device, determine the rolling torque of the wheel end with the bearings in a no-load end play condition. Due to part imbalance, there will be a variation in rolling torque as the wheel hub is rotated. Record maximum value of rolling torque throughout a revolution. This value will be the "no-load rolling torque" (LCB up to 200 lbf·ft [271 N·m], others 25 to 100 lbf·ft [34 - 135 N·m]).
5. For field service, torque nut to 400 lbf·ft [542 N·m]. Shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times while shocking wheel. Re-check nut torque - if nut moves, re-torque to 400 lbf·ft [542 N·m) and **repeat shocking while rotating and tightening** as many times as necessary **until 400 lbf·ft [542 N·m] does not advance nut.** Then advance nut until 3 holes in lock plate line up with tapped holes in internal gear hub.
6. Check rolling torque - must be in the specified range as shown on adjustment chart over no-load rolling torque.
7. If **over** the maximum preload, reduce nut torque as required to obtain the specified range but not less than 300 lbf·ft [406 N·m] on nut.
8. If **under** the minimum preload, increase nut torque until preload is in the specified rolling torque range with lock plate holes aligned, but not more than 900 lbf·ft [1220 N·m] after rotating the wheel hub 5 or more times.
9. Install lock plate and screws, tighten screws 35 to 40 lbf·ft [47 - 54 N·m]. (See page 14.)

Greater than no-load rolling torque

BEARING PRELOAD CHART		
Brake Type	**New Bearings**	**Used Bearings (Bearings in use 300 Hours or More)**
L.C.B.	30 to 60 lbf·ft [41 - 81 N·m]	10 to 25 lbf·ft [14 - 33 N·m]
No Brakes Disc or Drum	20 to 40 lbf·ft [27 - 54 N·m]	5 to 15 lbf·ft [7 - 20 N·m]

***NOTE:** Lock plate screws are of a self-locking type (orange) locking compound on threads. Use only one time, then replace or thoroughly clean used screws and apply either LOCTITE 262 (Hi strength) or LOCTITE 242 (Medium strength). Internal gear hub threads must also be cleaned when replacing screws.

(DOUBLE NUT AND NUT LOCK)
WHEEL BEARING ADJUSTMENT PROCEDURE
FOR THE 16T2847 AND 19T3747 SERIES AXLES
(With drum, dry disc or no brakes).

1. Before wheel bearing adjustment is made, it is imperative all tapered bearings and bearing cups be pressed to a fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearings and cups.

2. Install inner wheel bearing adjusting nut and tighten to 1000 lbf·ft torque [1356 N·m]. Shock internal gear hub with a heavy bar while rotating wheel hub two or three times.

3. Recheck inner nut torque. If nut moves, retorque to 1000 lbf·ft torque [1356 N·m] and repeat shocking while rotating and tightening as many times as necessary **until 1000 lbf·ft [1356 N·m] does not advance nut.**

4. Loosen inner nut 1/4 to 1/2 turn and shock wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely. Measure the no-load rolling torque (normally 25 to 100 lbf·ft torque) [34-135 N·m]. Retorque inner nut 150 - 200 lbf·ft [204-271 N·m]. Shock wheel hub while rotating and recheck rolling torque. See chart for new and used wheel bearing rolling torque.

5. When proper pre-load is achieved, install adjusting nut lock. Coat inner face of jam nut and spindle threads with Anti-Seize or Never-Seez lubricant and install jam nut. **NOTE:** The nut socket used to torque the jam nut should be depth controlled to prevent contact between the socket face and outer tangs of the nut lock (see page 19). This controlled depth will prevent torque from being transmitted from the socket face to the nut lock outer tangs and the possiblity of shearing the nut lock inner tang.

6. Tighten jam nut to 1000 lbf·ft torque [1356 N·m]. Recheck rolling torque. Rolling torque must be in the range of values shown in chart for new and used bearings.

7. If **over** the rolling torque value listed for new and used bearings, reduce the inner nut torque as required to obtain the proper rolling torque value listed.

8. If **under** the rolling torque value listed for new and used bearings after rotating the wheel hub 5 or more times, increase inner nut torque as required to obtain the proper rolling torque value listed.

9. When proper rolling torque is obtained, bend two tangs of the nut lock over the inner nut and two tangs over the jam nut. (See page 19.)

	Rolling Torque Range	Jam Nut Torque
Adjusting NEW Tapered Bearings:	12 to 20 lbf·ft torque. [16-27 N·m] Greater than "no-load rolling torque" value.	1000 lbf·ft [1356 N·m]
Readjusting USED Tapered Bearings:	5 to 10 lbf·ft torque [7 - 13 N·m]. Greater than "no-load rolling torque" value.	1000 lbf·ft [1356 N·m]

(DOUBLE NUT AND NUT LOCK)
WHEEL BEARING ADJUSTMENT PROCEDURE
FOR THE D33000 AND D37000 SERIES AXLES
With Liquid Cooled Brakes.

1. Before wheel bearing adjustment is made, it is imperative all tapered bearings and bearing cups be pressed to a fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearings and cups. Release brake pressure before continuing. (Any brake drag will affect obtaining correct rolling torque value).

2. Install inner wheel bearing adjusting nut and tighten to 1250 lbf·ft torque [1694 N·m]. Shock internal gear hub with a heavy bar while rotating wheel hub two or three times.

3. Recheck inner nut torque. If nut moves, retorque to 1250 lbf·ft torque [1694 N·m] and repeat shocking while rotating and tightening as many times as necessary **until 1250 lbf·ft [1694 N·m] does not advance nut.**

4. Loosen inner nut 1/4 to 1/2 turn and shock the wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely. Measure the no-load rolling torque (normally 25 to 100 lbf·ft torque [34 - 135 N·m]) but could be up to 200 lbf·ft [271 N·m], for axles with liquid cooled brakes due to friction plate drag). Retorque inner nut 150 - 200 lbf·ft [203 - 271 N·m]. Shock wheel hub while rotating and recheck rolling torque. See chart for new and used wheel bearing rolling torque.

5. When proper pre-load is achieved, install adjusting nut lock. Coat inner face of jam nut and spindle threads with Anti-Seize or Never-Seez lubricant and install jam nut. **NOTE:** The nut socket used to torque the jam nut should be depth controlled to prevent contact between the socket face and outer tangs of the nut lock (see page 19). This controlled depth will prevent torque from being transmitted from the socket face to the nut lock outer tangs and the possiblity of shearing the nut lock inner tang.

6. Tighten jam nut to 1250 lbf·ft torque [1694 N·m]. Recheck rolling torque. Rolling torque must be in the range of values shown in chart for new and used bearings.

7. If **over** the rolling torque value listed for new and used bearings, reduce the inner nut torque as required to obtain the proper rolling torque value listed.

8. If **under** the rolling torque value listed for new and used bearings after rotating the wheel hub 5 or more times, increase inner nut torque as required to obtain the proper rolling torque value listed.

9. When proper rolling torque is obtained, bend two tangs of the nut lock over the inner nut and two tangs over the jam nut. (See page 19.)

	Rolling Torque Range	Jam Nut Torque
Adjusting NEW Tapered Bearings:	15 to 30 lbf·ft torque. [20 - 40 N·m] Greater than "no-load rolling torque" value.	1250 lbf·ft [1694 N·m]
Readjusting USED Tapered Bearings:	5 to 10 lbf·ft torque. [7 - 13 N·m] Greater than "no-load rolling torque" value.	1250 lbf·ft [1694 N·m]

(SINGLE NUT AND LOCK PLATE)
WHEEL BEARING ADJUSTMENT
FOR THE 16D1841 (D33640), 19D2641 (D37660) SERIES AXLES

1. Before wheel bearing adjustment is made, it is imperative all tapered bearing cones and cups be pressed to fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearing cups and cones. **NOTE:** If the wheel bearing adjusting nut has an undercut on the inner diameter, the undercut must go toward the internal gear hub. On axles with LCB brakes, release pressure before continuing (any brake drag will affect obtaining correct rolling torque value.)
2. Coat inner face of nut, spindle threads and spindle splines with brush-applied lubricant. (Anti-Seize or Never-Seez).
3. Install spindle nut and tighten to 800 lbf·ft [1085 N·m] torque. Shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times. Recheck nut torque - if nut moves, retorque to 800 lbf·ft [1085 N·m] and **repeat shocking while rotating and tightening** as many times as necessary **until 800 lbf·ft [1083 N·m] does not advance nut.** Loosen 1/4 to 1/2 turn and shock the wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely.
4. Using a torque wrench adaptor bar or other appropriate measuring device, determine the rolling torque of the wheel end with the bearings in a no-load end play condition. Due to part imbalance, there will be a variation in rolling torque as the wheel hub is rotated. Record maximum value of rolling torque throughout a revolution. This value will be the "no-load rolling torque" (LCB up to 200 lbf·ft [271 N·m], others 25 to 100 lbf·ft [34 - 135 N·m]).
5. For field service, torque nut to 400 lbf·ft [542 N·m]. Shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times while shocking wheel. Re-check nut torque - if nut moves, re-torque to 400 lbf·ft [542 N·m) and **repeat shocking while rotating and tightening** as many times as necessary **until 400 lbf·ft [542 N·m] does not advance nut.** Then advance nut until 3 holes in lock plate line up with tapped holes in internal gear hub.
6. Check rolling torque - must be in the specified range as shown on adjustment chart over no-load rolling torque.
7. If **over** the maximum preload, reduce nut torque as required to obtain the specified range but not less than 300 lbf·ft [406 N·m] on nut.
8. If **under** the minimum preload, increase nut torque until preload is in the specified rolling torque range with lock plate holes aligned, but not more than 900 lbf·ft [1220 N·m] after rotating the wheel hub 5 or more times.
9. Install lock plate and screws, tighten screws 20 to 25 lbf·ft [27 - 33 N·m]. (See page 14.)

Greater than no-load rolling torque

BEARING PRELOAD CHART		
Brake Type	**New Bearings**	**Used Bearings (Bearings in use 300 Hours or More)**
L.C.B.	30 to 60 lbf·ft [41 - 81 N·m]	10 to 25 lbf·ft [14 - 33 N·m]
No Brakes Disc or Drum	20 to 40 lbf·ft [27 - 54 N·m]	5 to 15 lbf·ft [7 - 20 N·m]

*__NOTE:__ Lock plate screws are of a self-locking type (orange) locking compound on threads. Use only one time, then replace or thoroughly clean used screws and apply either LOCTITE 262 (Hi strength) or LOCTITE 242 (Medium strength). Internal gear hub threads must also be cleaned when replacing screws.

(SINGLE NUT AND LOCK PLATE)
WHEEL BEARING ADJUSTMENT PROCEDURE
FOR THE D37770 SERIES AXLE

1. Before wheel bearing adjustment is made, it is imperative all tapered bearing cones and cups be pressed to fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearing cups and cones. **NOTE:** If the wheel bearing adjusting nut has an undercut on the inner diameter, the undercut must go toward the internal gear hub. On axles with LCB brakes, release pressure before continuing (any brake drag will affect obtaining correct rolling torque value.)
2. Coat inner face of nut, spindle threads and spindle splines with brush-applied lubricant. (Anti-Seize or Never-Seez).
3. Install spindle nut and tighten to 1000 lbf·ft [1356 N·m] torque. Shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times. Recheck nut torque - if nut moves, retorque to 1000 lbf·ft [1356 N·m] and **repeat shocking while rotating and tightening** as many times as necessary **until 1000 lbf·ft [1356 N·m] does not advance nut.** Loosen 1/4 to 1/2 turn and shock the wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely.
4. Using a torque wrench adaptor bar or other appropriate measuring device, determine the rolling torque of the wheel end with the bearings in a no-load end play condition. Due to part imbalance, there will be a variation in rolling torque as the wheel hub is rotated. Record maximum value of rolling torque throughout a revolution. This value will be the "no-load rolling torque" (LCB up to 200 lbf·ft [271 N·m], others 25 to 100 lbf·ft [34 - 135 N·m]).
5. For field service, torque nut to 400 lbf·ft [542 N·m]. Shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times while shocking wheel. Re-check nut torque - if nut moves, re-torque to 400 lbf·ft [542 N·m) and **repeat shocking while rotating and tightening** as many times as necessary **until 400 lbf·ft [542 N·m] does not advance nut.** Then advance nut until 3 holes in lock plate line up with tapped holes in internal gear hub.
6. Check rolling torque - must be in the specified range as shown on adjustment chart over no-load rolling torque.
7. If **over** the maximum preload, reduce nut torque as required to obtain the specified range but not less than 300 lbf·ft [406 N·m] on nut.
8. If **under** the minimum preload, increase nut torque until preload is in the specified rolling torque range with lock plate holes aligned, but not more than 900 lbf·ft [1220 N·m] after rotating the wheel hub 5 or more times.
9. Install lock plate and screws, tighten screws 20 to 25 lbf·ft [27 - 33 N·m]. (See page 14.)

Greater than no-load rolling torque

BEARING PRELOAD CHART		
Brake Type	**New Bearings**	**Used Bearings (Bearings in use 300 Hours or More)**
L.C.B.	30 to 60 lbf·ft [41 - 81 N·m]	10 to 25 lbf·ft [14 - 33 N·m]
No Brakes Disc or Drum	20 to 40 lbf·ft [27 - 54 N·m]	5 to 15 lbf·ft [7 - 20 N·m]

***NOTE:** Lock plate screws are of a self-locking type (orange) locking compound on threads. Use only one time, then replace or thoroughly clean used screws and apply either LOCTITE 262 (Hi strength) or LOCTITE 242 (Medium strength). Internal gear hub threads must also be cleaned when replacing screws.

DRIVE AXLE WHEEL BEARING ADJUSTMENT PROCEDURE FOR AXLES USING BOLTED ON RETAINING PLATE AND SHIM PACKS FOR THE 25D7160, 25D8860, D75740 AND D85840 SERIES AXLES

1. Measure retaining plate thickness with micrometer and record.
2. Install retaining plate, washers and capscrews, but without shims.
3. While striking wheel hub and surrounding parts to seat bearings tighten capscrews to lbf·ft torque below. Tighten 1/2 - 13 capscrews to 100 lbf·ft torque [135 N·m]. Tighten 3/4 - 10 capscrews to 330 lbf·ft torque [447 N·m].
4. Loosen capscrews two (2) turns maximum. Then roll hub over five (5) times or more until hub spins freely.
5. Use torque wrench adaptor, properly centered, or other appropriate measuring device, to determine "no-load rolling torque".
6. For new bearings, tighten all capscrews till rolling torque is 30 - 50 lbf·ft torque [41 - 67 N·m] more then "no-load rolling torque". For used bearings*, tighten all capscrews till rolling torque is 10 - 20 lbf·ft torque [14 - 27 N·m] more then "no-load rolling torque".
7. Measure distance of face of retaining plate to end of spindle with micrometer depth gauge at 3 locations 120 degrees apart. **NOTE:** Some retaining plates will have holes 120° apart for micrometer rod. Record same, add up, and divide by 3 to obtain average value.
8. Subtract retaining plate thickness (Step 1) from average value (Step 7) and add .005 [0,12mm] to obtain value of shim pack thickness.
9. Choose and check shim pack with micrometer and record. (See example below.)
10. Remove retaining plate, roll hub over (5) times or more, then apply anaerobic locking compound (Loctite #262) to tapped holes only, add shim pack, mount retaining plate, and tighten capscrews to specified torque value (See capscrew size and torque value chart).
11. Recheck rolling torque after turning hub five (5) or more revolutions.
12. If final rolling torque is too high, repeat steps 10 and 11 after adding .001 [0,025mm] or more shim pack.
13. If final rolling torque is too low, repeat steps 10 and 11 after removing .001 [0.025mm] or more from shim pack. **(See page 15.)**

EXAMPLE:

Plate Thickness		.994 [25,25mm]
Depth measured at		
3 places 120° apart.		1.127 [28,62mm]
Add together & divide		1.125 [28,57mm]
by 3 to get average		1.126 [28,60mm]
depth gauge reading	3	3.378 [85,80mm]
Average -		**1.126**
Subtract plate thickness		
from average depth		1.126 [28,60mm]
gauge reading.		.994 [25,25mm]
		.132 [3,35mm]
Add .005 [0,12mm]		.005 [0,12mm]
Shim pack required		.137 [3,47mm]
Use micrometer & select		
shim pack in example		
shown use.		1-.062 [1,57mm]
		1-.031 [0,78mm]
		3-.010 [0,25mm]
		2-.007 [0,17mm]
Total -		**.137 [3,47mm]**

Capscrew Size	**Torque Value**
1/2-13 Grade 8	90-100 lbf·ft [123,0-135,0 N·m]
3/4-10 Grade 8	300-330 lbf·ft [407,0-447,0 N·m]
1 1/4-10 Grade 8	1475-1625 lbf·ft [1999,9-2203,3 N·m]
1 1/4-7 Grade 9	1850-2000 lbf·ft [2508,4-2711,8 N·m]

Axle Series	
D75740	1/2-13 Capscrew
D85840	3/4-10 Capscrew
25D7160	1 1/4-7 Capscrew
25D8860	1 1/4-7 Capscrew

***Bearings in use 300 hours or more.**

(SINGLE NUT AND LOCK PLATE)
WHEEL BEARING ADJUSTMENT PROCEDURE
AXLE SERIES

19D3747 19D3960 19D4049
19D4354 21D3747 21D3960
21D4049 21D4354 21D5073

1. Before wheel bearing adjustment is made, it is imperative all tapered bearing cones and cups be pressed to fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearing cups and cones. **NOTE:** If the wheel bearing adjusting nut has an undercut on the inner diameter, the undercut must go toward the internal gear hub. On axles with LCB brakes, release pressure before continuing. (Any brake drag will affect obtaining correct rolling torque value).
2. Coat inner face of nut, spindle threads and spindle splines with brush-applied lubricant. (Anti-Seize or Never-Seez).
3. Install spindle nut and tighten to 1200 lbf·ft [1627 N·m] torque. Shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times. Recheck nut torque - if nut moves, retorque to 1200 lbf·ft [1627 N·m] and **repeat shocking while rotating and tightening** as many times as necessary **until 1200 lbf·ft [1627 N·m] does not advance nut.** Loosen 1/4 to 1/2 turn and shock the wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely.
4. Using a torque wrench adaptor bar or other appropriate measuring device, determine the rolling torque of the wheel end with the bearings in a no-load end play condition. Due to part imbalance, there will be a variation in rolling torque as the wheel hub is rotated. Record maximum value of rolling torque throughout a revolution. This value will be the "no-load rolling torque" (LCB up to 200 lbf·ft [271 N·m], others 25 to 100 lbf·ft [34 - 135 N·m]).
5. For field service, torque nut to 600 lbf·ft [814 N·m]. Shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times while shocking wheel. Re-check nut torque - if nut moves, re-torque to 600 lbf·ft [814 N·m] and **repeat shocking while rotating and tightening** as many times as necessary **until 600 lbf·ft [814 N·m] does not advance nut.** Then advance nut until 3 holes in lock plate line up with tapped holes in internal gear hub.
6. Check rolling torque - must be in the specified range as shown on adjustment chart over no-load rolling torque.
7. If **over** the maximum preload, reduce nut torque as required to obtain the specified range but not less than 400 lbf·ft [542 N·m] on nut.
8. If **under** the minimum preload, increase nut torque until preload is in the specified rolling torque range with lock plate holes aligned, but not more than 1400 lbf·ft [1898 N·m] after rotating wheel hub 5 or more times.
9. Install lock plate and screws*, tighten screws 35 to 40 lbf·ft [47 - 54 N·m]. (See page 14.)

BEARING PRELOAD CHART		
Brake Type	**New Bearings**	**Used Bearings (Bearings in use 300 Hours or More)**
L.C.B.	30 to 80 lbf·ft [41 - 108 N·m]	10 to 25 lbf·ft [14 - 33 N·m]
No Brakes Dry Disc Type Drum Type	20 to 40 lbf·ft [27 - 54 N·m]	5 to 15 lbf·ft [7 - 20 N·m]

***NOTE:** Lock plate screws are of a self-locking type (orange) locking compound on threads. Use only one time, then replace or thoroughly clean used screws and apply either LOCTITE 262 (Hi strength) or LOCTITE 242 (Medium strength). Internal gear hub threads must also be cleaned when replacing screws.

(ADJUSTING NUT AND SCREWS)
WHEEL BEARING ADJUSTMENT FOR 25D6847 AXLES

1. Before wheel bearing adjustment is made, it is imperative all tapered bearing cones and cups be pressed to fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearing cups and cones.

2. Coat inner face of nut, spindle threads and spindle splines with brush-applied lubricant. (Anti-Seize or Never-Seez).

3. Install nut and tighten to 1200 lbf·ft. [1627 N·m] torque, shock internal gear hub with heavy bar while rotating wheel hub 2 to 3 times. Recheck nut torque - if nut moves, retorque to 1200 lbf·ft [1627 N·m] and repeat shocking while rotating and tightening as many times as necessary **until 1200 lbf·ft [1627 N·m] does not advance nut.**

4. Loosen nut 1/4 to 1/2 turn, shock to loosen and measure the no-load rolling torque (normally 25 to 100 lbf·ft [34 - 135 N·m]).

5. Torque to 700 lbf·ft [949 N·m] then advance nut until 3 holes in nut line up with tapped holes in internal gear hub.

6. Check rolling torque. Rolling torque must be in the range of 5 to 15 lbf·ft [7 - 20 N·m] for used bearings.* 20 to 80 lbf·ft [27 - 108 N·m] for new bearings above no-load rolling torque.

7. If over the maximum rolling torque, reduce nut torque as required to obtain the 5 - 15 or 20 -80 lbf·ft [7 - 20 or 27 - 108 N·m] range but not less than 400 lbf·ft [542 N·m] on nut. If this occurs, remove nut and internal gear hub, rotate internal gear hub 3 - 4 spline teeth or reverse nut and reassemble. Repeat bearing preload procedure.

8. If under the minimum rolling torque, increase nut torque until preload is in the 5 - 15 or 20 -80 lbf·ft [7 -20 or 27 - 108 N·m] rolling torque range with adjusting nut holes alligned with threaded holes in internal gear hub, but not nore than 1400 lbf·ft [1898 N·m] after rotating the wheel hub 5 or more times.

9. Apply Loctite #262 to the capscrew threads, Install 3 capscrews and tighten 35 to 40 lbf·ft [48 - 54 N·m]. (See page 16.)

*used bearings - (Bearings in use 300 hours or more.)

(DOUBLE NUT AND NUT LOCK)
WHEEL BEARING ADJUSTMENT PROCEDURE
FOR THE D75000 SERIES AXLES
(With drum, dry disc or no brakes).

1. Before wheel bearing adjustment is made, it is imperative all tapered bearings and bearing cups be pressed to a fully seated position. **DO NOT** depend on the wheel bearing adjusting nut to "shoulder" tapered bearings and cups.

2. Install inner wheel bearing adjusting nut and tighten to 1000 lbf·ft torque [1356 N·m]. Shock internal gear hub with a heavy bar while rotating wheel hub two or three times.

3. Recheck inner nut torque. If nut moves, retorque to 1000 lbf·ft torque [1356 N·m] and repeat shocking while rotating and tightening as many times as necessary **until 1000 lbf·ft [1356 N·m] does not advance nut.**

4. Loosen inner nut 1/4 to 1/2 turn and shock wheel hub until a slight bearing end play is achieved and the wheel hub can rotate freely. Measure the no-load rolling torque (normally 0 to 50 lbf·ft torque) [0-68 N·m]. Retorque inner nut 100 - 150 lbf·ft [135-203 N·m]. Shock wheel hub while rotating and recheck rolling torque. See chart for new and used wheel bearing rolling torque.

5. When proper pre-load is achieved, install adjusting nut lock. Coat inner face of jam nut and spindle threads with Anti-Seize or Never-Seez lubricant and install jam nut. **NOTE**: The nut socket used to torque the jam nut should be depth controlled to prevent contact between the socket face and outer tangs of the nut lock (see page 19). This controlled depth will prevent torque from being transmitted from the socket face to the nut lock outer tangs and the possiblity of shearing the nut lock inner tang.

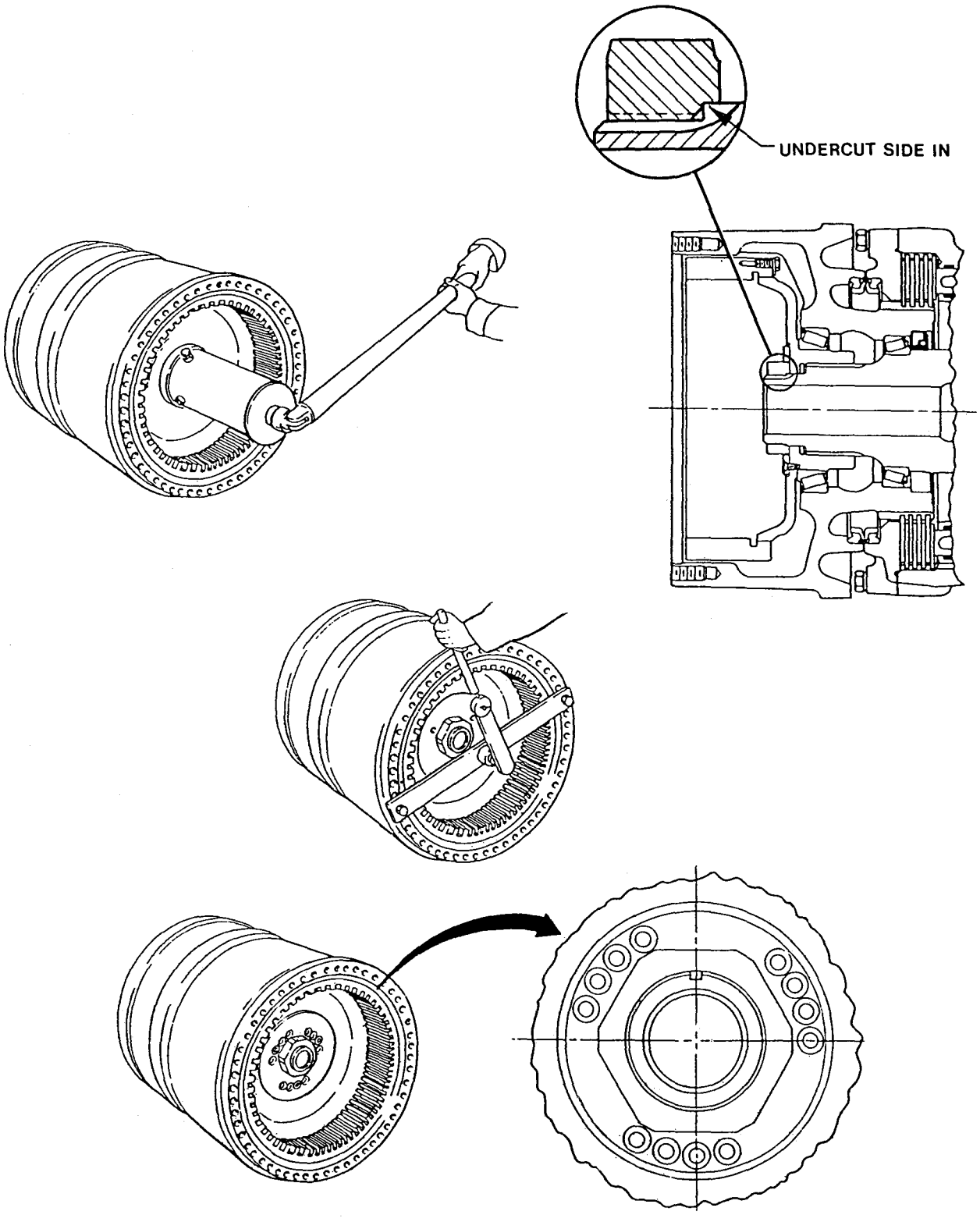
6. Tighten jam nut to 1500 lbf·ft torque [2035 N·m]. Recheck rolling torque. Rolling torque must be in the range of values shown in chart for new and used bearings.

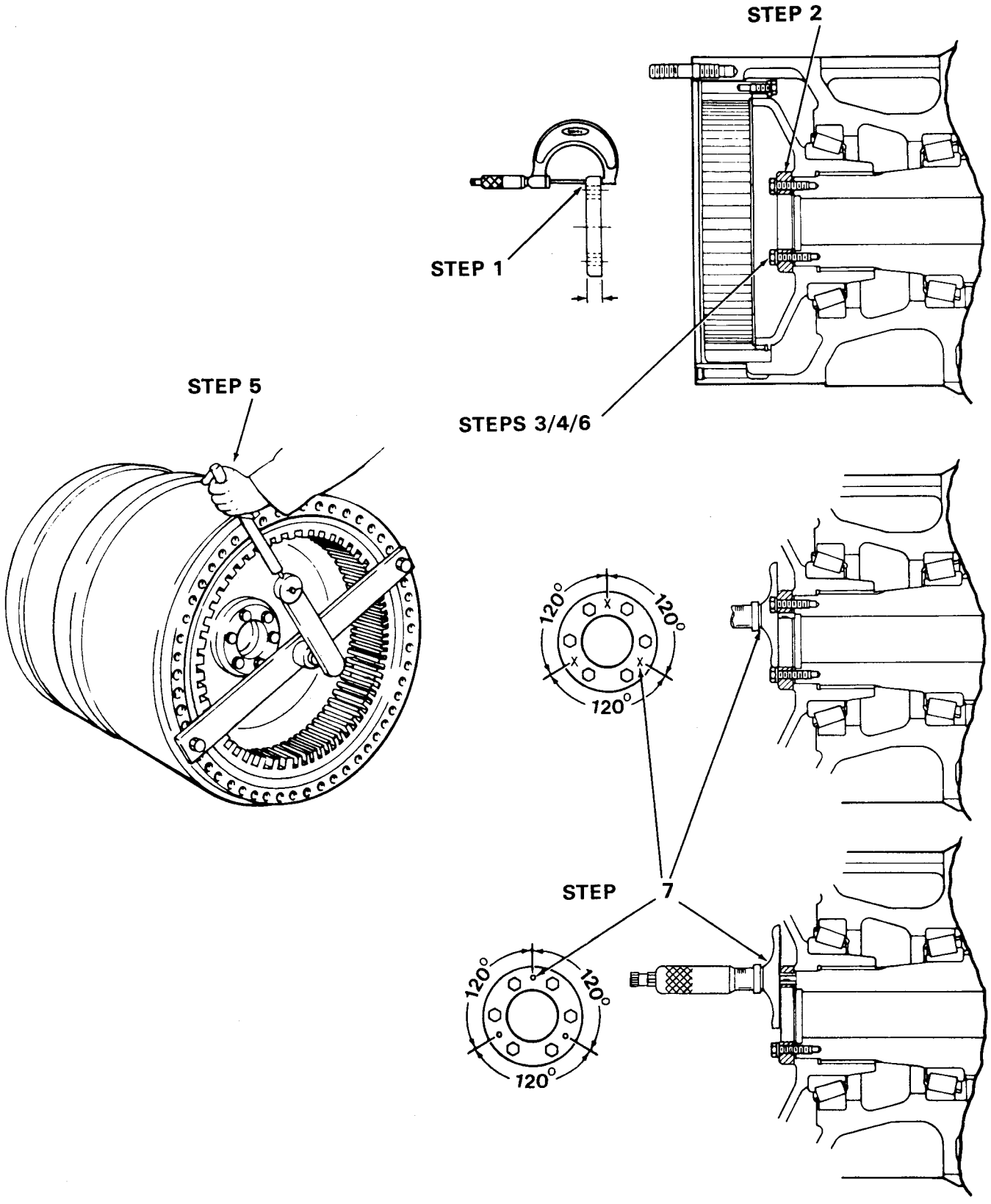
7. If **over** the rolling torque value listed for new and used bearings, reduce the inner nut torque as required to obtain the proper rolling torque value listed.

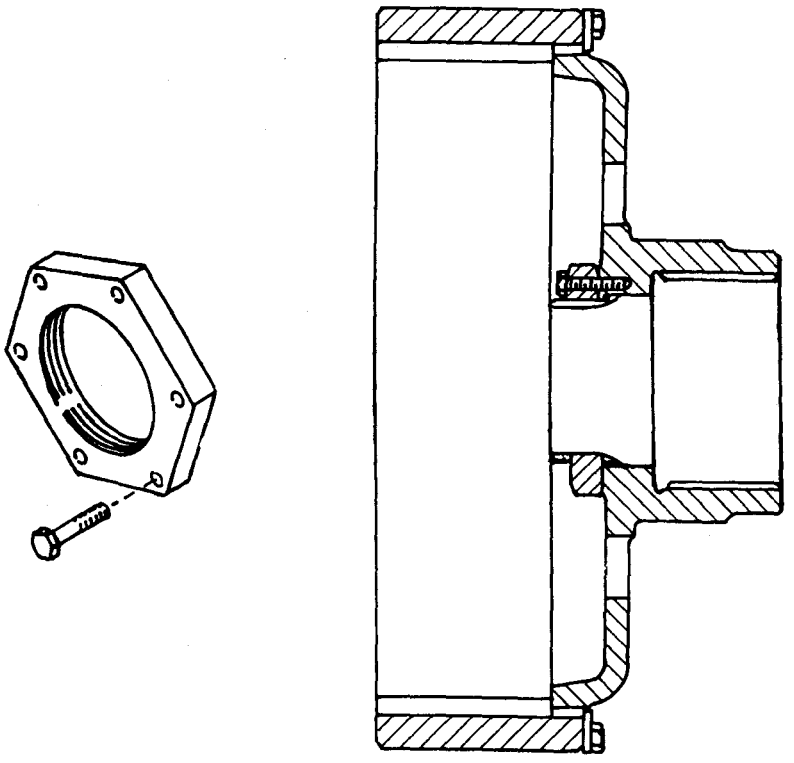
8. If **under** the rolling torque value listed for new and used bearings, increase inner nut torque as required to obtain the proper rolling torque value listed.

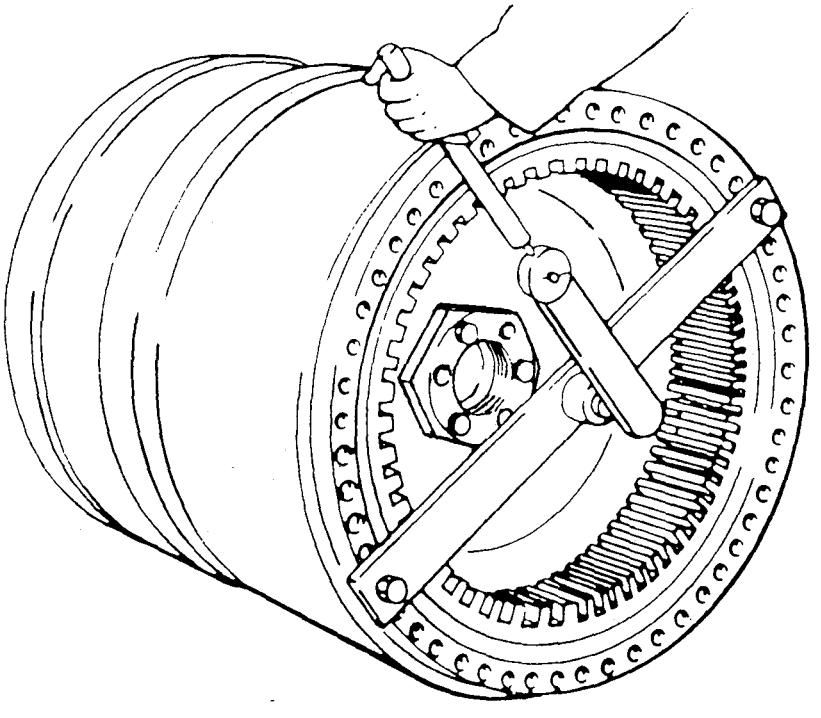
9. When proper rolling torque is obtained, bend two tangs of the nut lock over the inner nut and two tangs over the jam nut. (See page 19.)

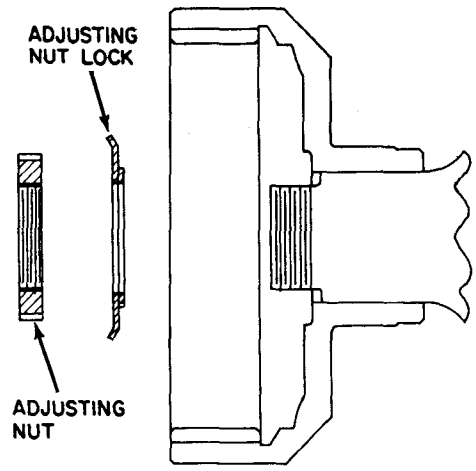
	Rolling Torque Range	Jam Nut Torque
Adjusting NEW Tapered Bearings:	20 to 40 lbf·ft torque. [27 - 54 N·m] Greater than "no-load rolling torque" value.	1500 lbf·ft [2034 N·m]
Readjusting USED Tapered Bearings:	5 to 15 lbf·ft. torque [7 - 20 N·m]. Greater than "no-load rolling torque" value.	1500 lbf·-ft [2034 N·m]

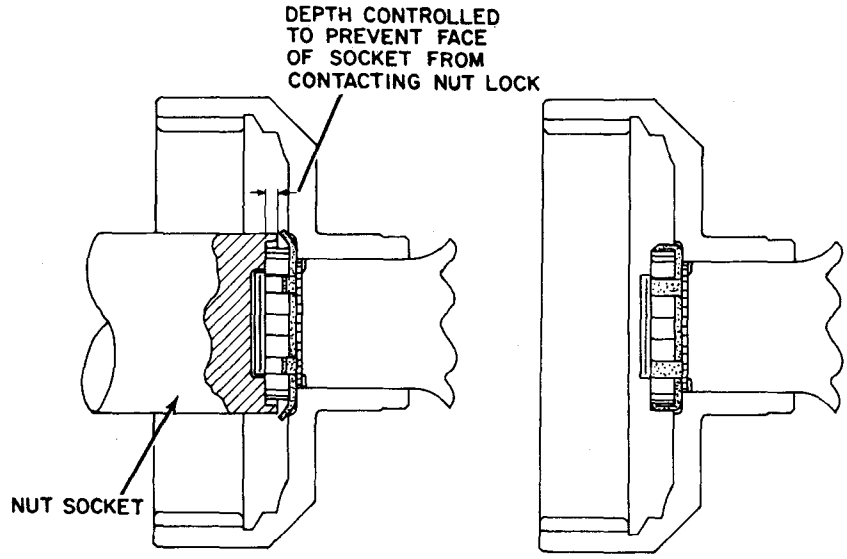

UNDERCUT SIDE IN

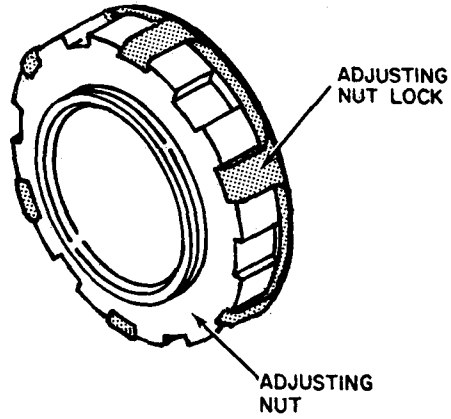

STEP 2
STEP 1
STEPS 3/4/6
STEP 5
120°
120°
120°
STEP 7
120°
120°
120°

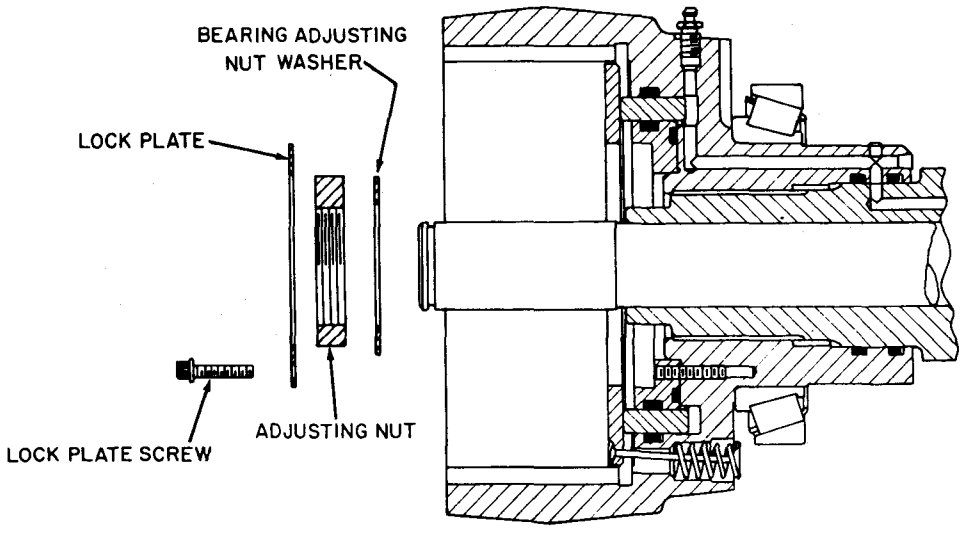


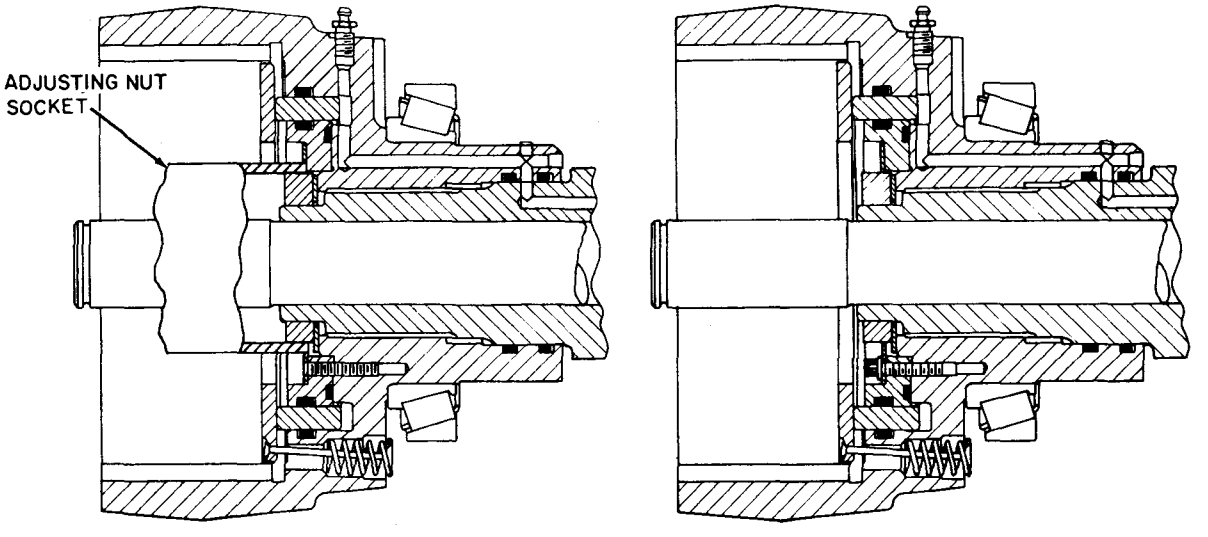


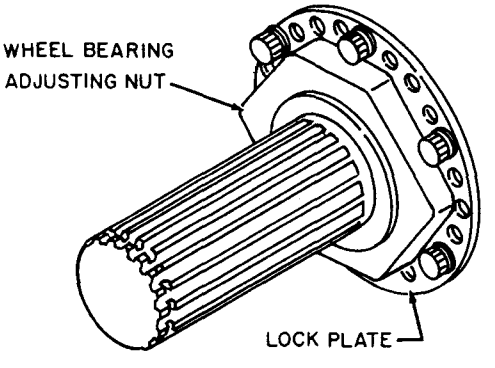

ADJUSTING
NUT LOCK
ADJUSTING
NUT


DEPTH CONTROLLED
TO PREVENT FACE
OF SOCKET FROM
CONTACTING NUT LOCK
NUT SOCKET


ADJUSTING
NUT LOCK
ADJUSTING
NUT


BEARING ADJUSTING
NUT WASHER
LOCK PLATE
LOCK PLATE SCREW
ADJUSTING NUT


ADJUSTING NUT
SOCKET


WHEEL BEARING
ADJUSTING NUT
LOCK PLATE

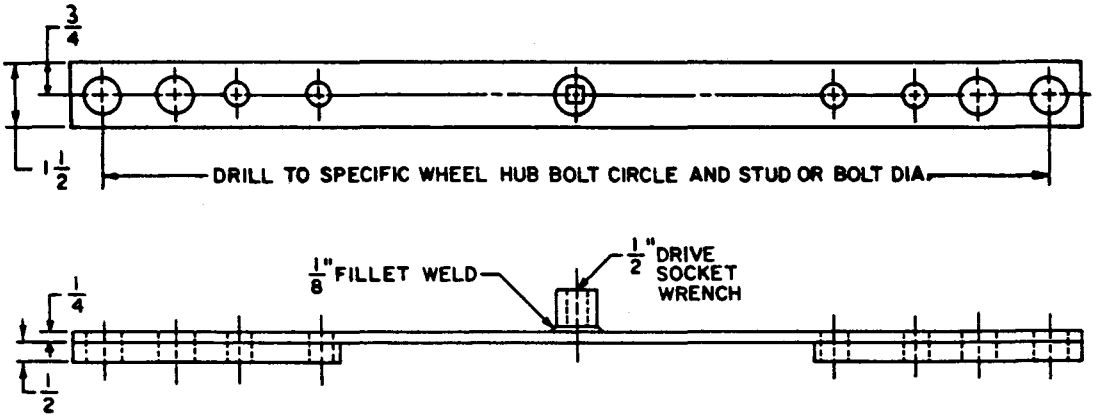
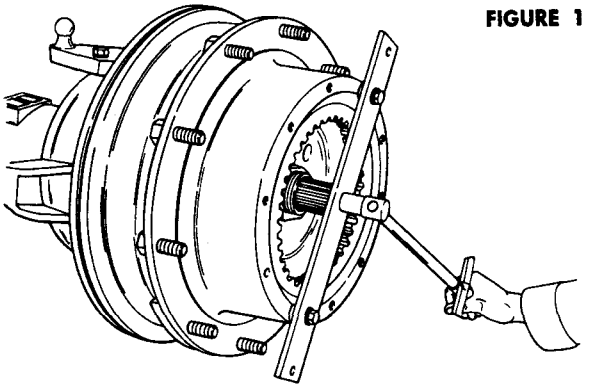


FIGURE 1



When proper pre-load is achieved install adjusting nut lock. Coat inner face of jam nut with Anti-Seize or Never-Seez lubricant and install. **NOTE:** The nut socket used to torque the jam nut should be depth controlled to prevent contact between the socket face and outer tangs of the nut lock (see Figure 2). This controlled depth will prevent torque from being transmitted from the socket face to the nut lock outer tangs and the possiblity of shearing the nut lock inner tang. Tighten jam nut to full recommended torque. Recheck final rolling torque, which should not be greater than the sum of the "No-load" rolling torque plus the highest valúe of rolling torque specified for respective axle series.

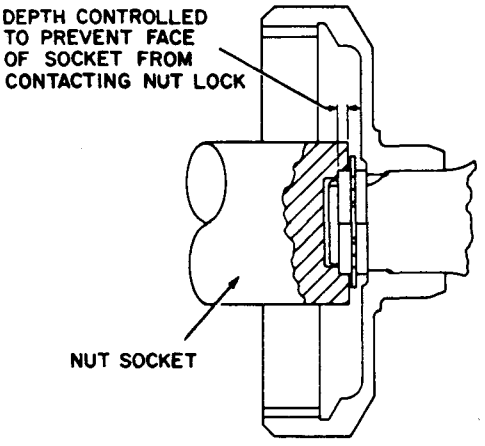
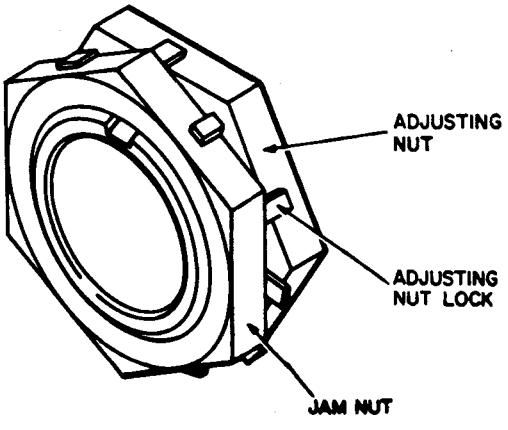


FIGURE 2

WHEN PROPER PRE-LOAD IS ACHIEVED BEND TWO TANGS OF NUT LOCK ON FLATS OF INNER NUT (ADJUSTING) AND TWO TANGS ON FLAT OF JAM NUT.



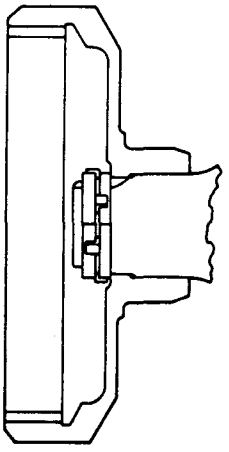


FIGURE 3