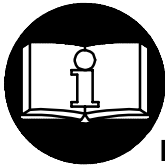


MAINTENANCE SECTION COVERING ANGLE HEAD MODULES for SERIES DEA120 TORQUE CONTROL WRENCHES

⚠ WARNING



**IMPORTANT SAFETY INFORMATION ENCLOSED.
READ ALL THESE INSTRUCTIONS BEFORE PLACING TOOL IN SERVICE OR
OPERATING THIS TOOL AND SAVE THESE INSTRUCTIONS.
IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION
IN THIS MANUAL INTO THE HANDS OF THE OPERATOR.
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.**

Disconnect the Power Cord from the receptacle before performing any maintenance on this tool.



This symbol is to alert the user and service personnel to the presence of uninsulated dangerous voltage that will cause a risk of electric shock.



This symbol is to alert the user and service personnel to the presence of important operating instructions that must be read and understood to prevent personal injury, electrical shock or damage to the equipment.

**WHEN USING ELECTRIC TOOLS, BASIC SAFETY PRECAUTIONS SHOULD
ALWAYS BE FOLLOWED TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK
AND PERSONAL INJURY, INCLUDING THE FOLLOWING.**

PLACING TOOL IN SERVICE

- Use only with Ingersoll–Rand Series Controllers.
- Always operate, inspect and maintain this tool in accordance with all regulations (local, state, federal and country), that may apply to hand held/hand operated electric tools.
- Inspect tool cords periodically and if damaged, have them repaired by an authorized service facility.
- Do not remove any labels. Replace any damaged label.

USING THE TOOL

- Always wear eye protection when operating or performing maintenance on this tool.
- Always wear hearing protection when operating this tool.

- Power tools can vibrate in use. Vibration, repetitive motions, or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.
- **Guard Against Electric Shock.** Prevent body contact with earthed or grounded surfaces. For example; pipes, radiators, ranges, refrigerator enclosures.
- **Don't abuse Cord.** Never carry tool by cord or yank it to disconnect from receptacle. Keep cord from heat, oil, and sharp edges.
- **Keep work area clean.** Cluttered areas and benches invite injuries.

(Continued on page 4-2)

NOTICE

The use of other than genuine Ingersoll–Rand replacement parts may result in personal injury, decreased tool performance and increased maintenance, and may invalidate all warranties.

Have your tool repaired by a qualified person. This electric tool is in accordance with the relevant safety requirements. Repairs should only be carried out by qualified persons using original spare parts, otherwise this may result in considerable danger to the user.

Repairs should be made only by authorized, trained personnel. Consult your nearest Ingersoll–Rand Authorized Servicenter.

Refer All Communications to the Nearest
Ingersoll–Rand Office or Distributor.

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INGERSOLL-RAND®
PROFESSIONAL TOOLS





FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.


USING THE TOOL (*Continued*)

- **Consider work area environment.** Don't expose power tools and chargers to water. Keep work area well lighted. Do not use tool in explosive or flammable atmospheres.
- **Keep bystanders and children away.** Do not permit unauthorized personnel to operate this tool, or touch tool or cord.
- **Store idle tools.** When not in use, tools should be stored in a dry, high or locked up place, out of reach of children.
- **Don't force tool.** It will do the job better and more safely at the rate for which it was intended.
- **Use the right tool.** Do not force a small tool or attachment to do the job of a heavy-duty tool.
- **Do not use a tool for a purpose for which it is not intended.** Example: Do not use a screwdriver as a drill.
- **Dress properly.** Do not wear loose clothing or jewelry. They can be caught in moving parts. Rubber gloves and non-skid footwear are recommended when working outdoors. Wear protective hair covering to contain long hair.
- **Secure work.** Use clamps or a vise to hold work. Operators often need both hands to perform job functions.
- **Don't overreach.** Keep proper footing, balance, and a firm grip on the tool at all times.
- **Maintain tools with care.** Keep tools clean for better and safer performance. Follow instructions for lubricating and changing accessories. Inspect tool cords periodically and if damaged, have them repaired by an authorized service facility. Inspect extension cords periodically and replace if damaged. Keep handles dry, clean, and free from oil and grease.
- **Remove adjusting keys and wrenches.** Form habit of checking to see that keys and adjusting wrenches are removed from tool before turning it on.
- **Avoid unintentional starting.** Don't carry tool with finger on switch.
- **Do not drop or abuse the tool.**
- **Whenever a tool is not being used, position the Power Switch to the "OFF" position and unplug the power cord.**
- **Stay alert.** Watch what you are doing. Use common sense. Do not operate tool when you are tired.
- **Check damaged parts.** Before further use of the tool, a guard or other part that is damaged should be carefully checked to determine that it will operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting, and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced by an authorized service center unless otherwise indicated elsewhere in this operation manual.
- **Have defective switches replaced by an authorized service center.**
- **Do not use the tool if the switch does not turn it on and off.**
- **Whenever the Angle Head is installed or repositioned, the Throttle Lever must be positioned so that reaction torque will not tend to retain the throttle in the "ON" position.**
- **When installing or removing the output device on any tool, ALWAYS grasp a metal component of the tool while tightening or loosening the Coupling Nut or Spindle Cap. Acceptable clamping locations include, but are not limited to, the hex on the Gear Case, the Tool Hanger, the Torque Reaction Arm or any metal Mounting Plate. NEVER grasp the composite tool body or handle in vise jaws to restrain the torque of the Coupling Nut or Spindle Cap. Such practice will result in damage to the tool.**
- **Do not use power units and gear trains that exceed the capability of the output device.**
- **The Tube Nut Attachment has an opening on the front side for construction and application purposes. DO NOT, under any circumstance place your fingers in this opening.**
- **The Torque Reaction Bar must be positioned against a positive stop. Do not use the Bar as a dead handle and take all precautions to make certain the operator's hand cannot be pinched between the Bar and a solid object.**
- **When operated continuously for long periods of time, Series D Nutrunners may become hot at the spindle end of the tool. Take all precautions necessary to avoid skin contact with the hot surfaces. Prolonged contact may result in burns.**
- **All Series D Torque Control Wrenches and Nutrunners with reverse capability have rotational arrows molded into the housing in the area of the reversing mechanism. When the direction switching device is positioned nearest the molded circular arrow with an "F" in the center, spindle rotation will be forward or clockwise direction. When the direction switching device is positioned nearest the molded circular arrow with an "R" in the center, spindle rotation will be reverse or counterclockwise direction.**
- **Use only impact sockets and accessories. Do not use hand (chrome) sockets or accessories.**


WARNING LABEL IDENTIFICATION


	⚠ WARNING
	Always wear eye protection when operating or performing maintenance on this tool.


	⚠ WARNING
	Always wear hearing protection when operating this tool.


	⚠ WARNING
	Always turn off the electrical supply and disconnect the power cord before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.


	⚠ WARNING
	Powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.

	⚠ WARNING
	Do not carry the tool by the cord.

	⚠ WARNING
	Do not use damaged, frayed or deteriorated power cords.

	⚠ WARNING
	INDOOR USE ONLY.

	⚠ WARNING
	The Torque Reaction Bar must be positioned against a positive stop. Do not use the Bar as a dead handle and take all precautions to make certain the operator's hand cannot be pinched between the Bar and a solid object.

	⚠ WARNING
	Keep body stance balanced and firm. Do not overreach when operating this tool.

LUBRICATION



Ingersoll-Rand No. 67

After each eight hours of operation, inject 1 to 2 cc of Ingersoll-Rand No. 67 Grease into the Grease Fitting (401) in the Angle Housing Assembly (400).

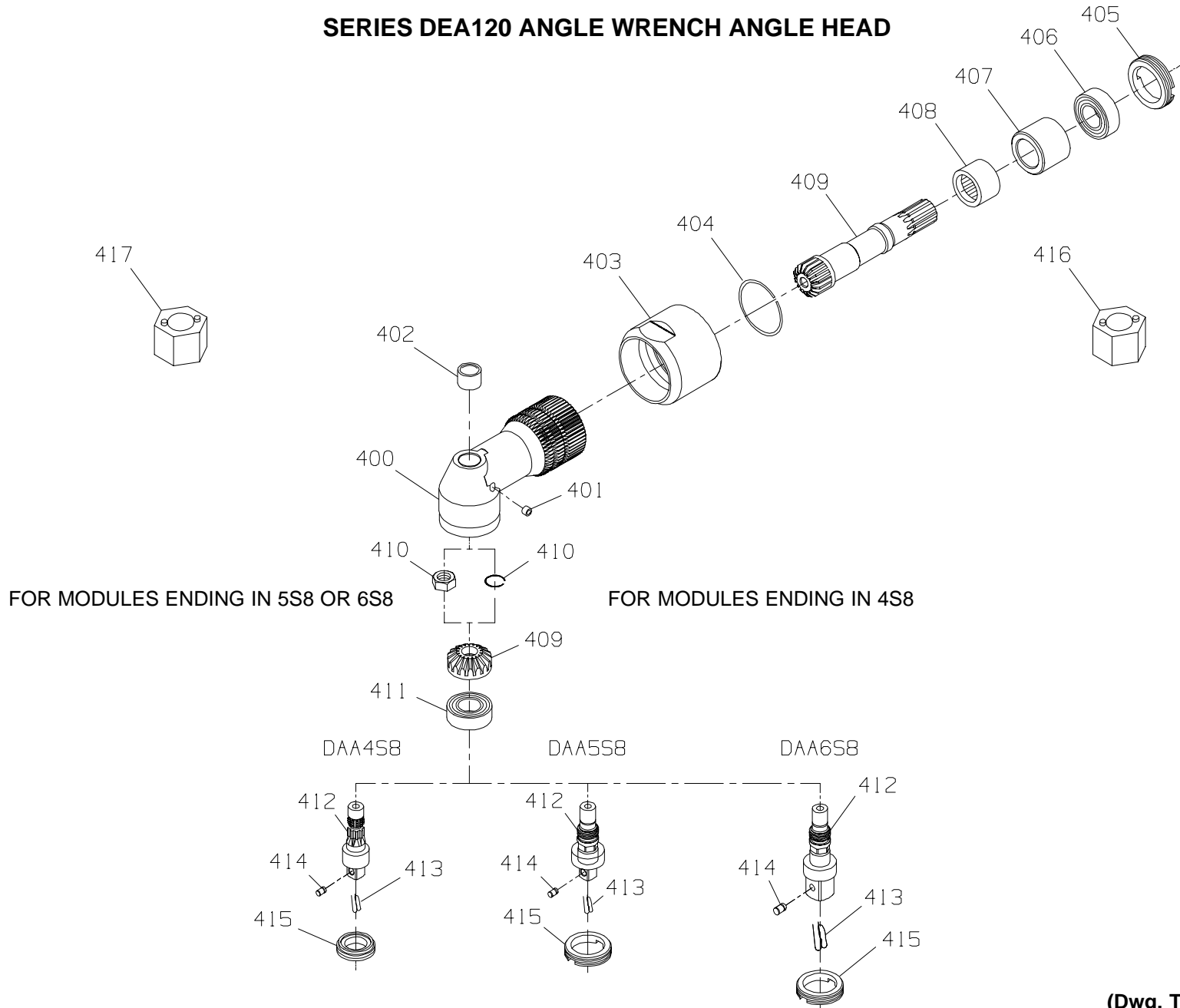
Whenever a Series D Angle Attachment is disassembled for repair or replacement of parts, apply 6 cc to 10 cc of Ingersoll-Rand No. 67 Grease to the Bevel Pinion and Bevel Gear (409) used in DAA4 Angle Attachments, 8 to 12 cc of Ingersoll-Rand No. 67 Grease to the Bevel Pinion and Bevel Gear used in DAA5 Angle Attachments, 10 to 14 cc of Ingersoll-Rand No. 67 Grease to the Bevel Pinion and Bevel Gear used in DAA6 Angle Attachments.

INSTALLATION

⚠ WARNING

When installing or removing an Angle Attachment on a tool, ALWAYS hold the tool by the flats on the Gear Case or by the front of the Angle Head while tightening the Coupling Nut (410). NEVER grasp the composite tool body or handle in vise jaws to restrain the tightening torque of the Coupling Nut. Such practice will result in damage to the tool and with electric models will cause wire leads to malfunction creating an electric shock hazard.

SERIES DEA120 ANGLE WRENCH ANGLE HEAD



44



PART NUMBER FOR ORDERING



	Angle Head Module	DAA4S8	DAA5S8	DAA6S8
400	Angle Housing Assembly	DAA4-B550	DAA5-B550	DAA6-B550
401	Grease Fitting	D0F9-879	D0F9-879	D0F9-879
402	Upper Spindle Bearing	R18L-603	DAA5-603	H54U-535
403	Coupling Nut	DAA4-27	DAA4-27	DAA4-27
404	Coupling Nut Retainer	DAA4-29	DAA4-29	DAA4-29
405	Rear Pinion Bearing Cap	8SA32-531	8SA32-531	8SA32-531
406	Rear Pinion Bearing	8SA32-593	8SA32-593	8SA32-593
407	Spacer	DAA4-165	DAA4-165	DAA4-165
408	Front Pinion Bearing	182A53-606	182A53-606	182A83-606
409	Bevel Gear Set	DAA4-A552	DAA5-A552	DAA6-A552
410	Bevel Gear Retainer	8SA32-578	182A53-578	182A83-578
411	Lower Spindle Bearing	8SA32-593	182A53-593	182A83-593
412	Spindle Assembly	DAA3-P507-1/2	182A53-P507-1/2	182A83-P507-1/2
413	Spring	5UHD-718	5UHD-718	5UHD-718
414	Retainer	804-716	804-716	804-716
415	Lower Spindle Bearing Cap	8SA32-531	182A53-531	182A83-531
416	Pinion Bearing Cap Wrench	8SA32-26	8SA32-26	8SA32-26
417	Spindle Bearing Cap Wrench	8SA32-26	WFS182-26	WFS182-26

MAINTENANCE SECTION

Disassembly of the Angle Attachment

1. Carefully grasp the flats on the Gear Case Assembly or the front of the Angle Head in copper-covered or leather-covered vise jaws so that the Angle Housing Assembly (400) is facing downward.
2. Using a wrench on the flats of the Coupling Nut (403), loosen the Coupling Nut from the Gear Case. Remove the tool from the vise. Unscrew the Coupling Nut and separate the Angle Housing Assembly from the Gear Case.
3. Carefully grasp the Angle Housing Assembly in copper-covered or leather-covered vise jaws with the Spindle Assembly (412) facing upward.

NOTICE

In the following step, the Spindle Bearing Cap (415) has a left-hand thread.

4. Using the Spindle Bearing Cap Wrench (417), unscrew and remove the Lower Spindle Bearing Cap (415). Withdraw the Spindle from the Angle Housing Assembly. Inspect the Lower Spindle Bearing (411) for looseness or roughness. If either of these conditions exists, replace the Bearing as follows:

For models ending in 4S8

- a. Remove the Bevel Gear Retainer (410).
- b. Press the Bevel Gear (409) and press the Lower Spindle Bearing from the Spindle.

For models ending in 5S8 or 6S8

- a. Grasp the square drive end of the Spindle in copper-covered vise jaws.
- b. Unscrew the Bevel Gear Retainer (410) and press the Bevel Gear (409) and the Lower Spindle Bearing from the Spindle.

NOTICE

In the next step, do not remove the Upper Spindle Bearing unless you have a new Bearing ready to install. This type of Bearing is always damaged during the removal process.

5. Inspect the Upper Spindle Bearing (402) for looseness or roughness. If either of these conditions exist, press the Bearing from the Angle Housing (400).

NOTICE

In the following step, the Rear Pinion Bearing Cap has a left-hand thread.

6. Using the Pinion Bearing Cap Wrench (416), unscrew and remove the Rear Pinion Bearing Cap (405).

NOTICE

In the following step, do not remove the Bevel Pinion Assembly unless you have a new Front Pinion Bearing (408) ready to install. This type of Bearing is always damaged during the removal process.

7. Grasp the spline of the pinion shaft in copper-covered vise jaws and while gently tapping the rear face of the Angle Housing with a soft hammer, pull the Bevel Pinion (409), Front Pinion Bearing (408), Spacer (407), and Rear Pinion Bearing (406) from the Angle Housing. The 1/4-20 tapped hole in the rear end of the Gear Shaft has been provided to aid in extracting the Bevel Pinion and its bearings from the Angle Housing.
8. After the Angle Attachment is disassembled, check all parts for damage or wear.

NOTICE

The Bevel Gear and Bevel Pinion are specially matched sets. Some sets are color coded for manufacturing purposes only. Only the Gear and Pinion set furnished as a replacement part or the same Gear and Pinion set removed from one tool, is a matched set. A Bevel Gear from one tool used with a Bevel Pinion from another tool with the same color code IS NOT A MATCHED SET. Replace these parts only as a matched set. Failure to do so will result in unsatisfactory tool performance and damage to the Bevel Gear and Bevel Pinion.

9. If the gear teeth on either the Bevel Pinion or Bevel Gear are worn or chipped, replace both parts. These are a matched set and must be replaced with another matched set.

MAINTENANCE SECTION

Assembly of the Angle Attachment

1. Apply a light coating of Ingersoll–Rand No. 67 Grease to all working parts prior to assembly.

NOTICE

The Bevel Gear and Bevel Pinion are specially matched sets. Some sets are color coded for manufacturing purposes only. Only the Gear and Pinion set furnished as a replacement part or the same Gear and Pinion set removed from one tool, is a matched set. A Bevel Gear from one tool used with a Bevel Pinion from another tool with the same color code IS NOT A MATCHED SET. Replace these parts only as a matched set. Failure to do so will result in unsatisfactory tool performance and damage to the Bevel Gear and Bevel Pinion.

2. **For DAA4 Angle Attachments**, insert the splined end of the Bevel Pinion (409) into the unstamped end of the Front Pinion Bearing (408), Spacer (407), and Rear Pinion Bearing (406). The marked surface of the Rear Pinion Bearing must face away from the shoulder on the Bevel Pinion. Using a sleeve that will contact the inner race of the Rear Pinion Bearing (406), press the Bearing onto the Bevel Pinion to seat the parts properly. Apply 6 to 10 cc of Ingersoll–Rand No. 67 Grease to the gear end of the Bevel Pinion.
For DAA5 Angle Attachments, insert the splined end of the Bevel Pinion (409) into the unstamped end of the Front Pinion Bearing (408), Spacer (407), and Rear Pinion Bearing (406). The marked surface of the Rear Pinion Bearing must face away from the shoulder on the Bevel Pinion. Using a sleeve that will contact the inner race of the Rear Pinion Bearing (406), press the Bearing onto the Bevel Pinion to seat the parts properly. Apply 8 to 12 cc of Ingersoll–Rand No. 67 Grease to the gear end of the Bevel Pinion.
For DAA6 Angle Attachments, insert the splined end of the Bevel Pinion (409) into the unstamped end of the Front Pinion Bearing (408), Spacer (407), and Rear Pinion Bearing (406). The marked surface of the Rear Pinion Bearing must face away from the shoulder on the Bevel Pinion. Using a sleeve that will

contact the inner race of the Rear Pinion Bearing (406), press the Bearing onto the Bevel Pinion to seat the parts properly. Apply 10 to 14 cc of Ingersoll–Rand No. 67 Grease to the gear end of the Bevel Pinion.

3. Insert the assembled Bevel Pinion, gear end first, into the long bore of the Angle Housing (400). Using a sleeve that will contact the outer race of the Rear Pinion Bearing (406), press the Bearing into the Angle Housing to seat both the Front Pinion Bearing (408) and the Rear Pinion Bearing (406).

NOTICE

In the following step, the Rear Pinion Bearing Cap has a left–hand thread.

4. Clean the threads on the Angle Housing and Rear Pinion Bearing Cap (405) and Apply a thin film of Perma–Lok MM–115* to the threads on the Rear Pinion Bearing Cap (405).
5. Using the Pinion Bearing Cap Wrench (416), tighten the Bearing Cap into the Angle Housing between 20 and 25 ft. Lbs. (27 to 34 Nm) torque.
6. If the Lower Spindle Bearing (411) has been removed, proceed as follows:
 - a. Using a sleeve that will contact the inner ring of the Bearing, press the Bearing onto Spindle (412). Press on the Bearing with the side marked in red against the Spindle shoulder.
 - b. Slide the Bevel Gear (409) onto the Spindle (412), align the internal flats of the Bevel Gear (409) with the flats on the Spindle and press the Bevel Gear onto the Spindle.

For DAA4 Angle Attachments, spread the Bevel Gear Retainer (410) and slip it over the end of the Spindle (412). Slide the retainer down the spindle and into the groove around the spindle to retain the Bevel Gear.

For DAA5 Angle Attachments, apply Perma–Lok HM–118* to the threads of the Bevel Gear Retainer (410) and tighten it on the Spindle between 45 and 55 ft.–lbs. (61 and 75 Nm) torque.

For DAA6 Angle Attachments, apply Perma–Lok HM–118* to the threads of the Bevel Gear Retainer (410) and tighten it on the Spindle between 45 and 55 ft.–lbs. (68 and 81 Nm) torque.

* Product of National Starch and Chemical Corporation.

MAINTENANCE SECTION

NOTICE

In the following step, press on the stamped face (closed end) of the Bearing. Failure to do so will cause damage to the Bearing.

7. If the Upper Spindle Bearing (402) has been removed, proceed as follows: Apply a light coating of Ingersoll–Rand No. 67 Grease to the Upper Spindle Bearing. Using a sleeve that will contact the outer race of the Upper Spindle Bearing (402). Press the new Spindle Bearing into the small bore opposite the threaded end of of the Angle Housing to a depth of .010 to .030 below the outer surface of the Angle Housing.
8. Apply 8 to 12 cc of Ingersoll–Rand No. 67 Grease to the Bevel Gear. Lubricate the Upper Spindle Bearing and Lower Spindle Bearing and install the Spindle in the Angle Housing.
9. Clean the threads on the Angle Housing and the Spindle Bearing Cap (420) and apply a film of Perma–Lok MM–115 to the threads.

NOTICE

In the following step, the Lower Spindle Bearing Cap has a left–hand thread.

10. Using the Spindle Bearing Cap Wrench (417), tighten the Bearing Cap into the Angle Housing between 20 and 25 ft. lbs. (27 to 34 Nm) torque.
11. If the Coupling Nut (410) was removed, slide the Coupling Nut, threaded end trailing, over the motor end of the Angle Housing. Apply the Coupling Nut Retainer (411) to the external groove on the motor end of the Angle Housing.
12. Engage the spline on the Bevel Pinion with the matching internal spline of the Spindle Planet Gear Head and thread the Coupling Nut onto the Gear Case. Orient the angle attachment to the desired position and tighten the Coupling Nut between 50 and 60 ft–lbs. (68 and 81 Nm) torque.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Angle Head gets hot	Excessive grease	Clean and inspect the Angle Head and gearing parts. Lubricate as instructed on front page.
	Inadequate grease	Inject 0.5 to 1.5 cc of grease into the Grease Fitting.
	Worn or damaged parts	Clean and inspect the Angle Head and gearing parts. If the Bevel Gear and/or Bevel Pinion is worn or broken, replace both parts as they are a matched set.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.