



**45612736**  
Edition 2  
May 2014

## **Air Drill**

**6L Series**

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# **Maintenance Information**



Save These Instructions

**IR** *Ingersoll Rand*<sup>®</sup>

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## Product Safety Information

### WARNING

- Failure to observe the following warnings, and to avoid these potentially hazardous situations, could result in death or serious injury.
- Read and understand this and all other supplied manuals before installing, operating, repairing, maintaining, changing accessories on, or working near this product.
- Always wear eye protection when operating or performing maintenance on this tool. The grade of protection required should be assessed for each use and may include impact-resistant glasses with side shields, goggles, or a full face shield over those glasses.
- Always turn off the air supply, bleed the air pressure and disconnect the air supply hose when not in use, before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool or any accessory.

**Note:** When reading the instructions, refer to exploded diagrams in parts Information Manuals when applicable (see under Related Documentation for form numbers).

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### Lubrication

Each time the Series 6L Angle Drills are disassembled for maintenance, repair or replacement of parts, lubricate the tool as follows:

1. Moisten all O-rings with O-ring lubricant.
  2. Work approximately 1.5 cc of grease into the Rear Rotor Bearing (21), Front Rotor Bearing (28) and the Spindle Bearing (48).
  3. Work approximately 6 cc to 8 cc of grease into the H, J, JJ, K or L ratio gear train and 10 cc to 12 cc of grease into the M, P or R ratio gear train. Grease the Planet Gear Bearings (32, 35, 39 and 42), the gear teeth inside the Gear Case (44) and the planet gear shafts on the Spindle (29) and Gear Head (38).
  4. Work approximately 0.5 cc to 1.0 cc of grease into the Lower Spindle Bearing (119).
  5. Work approximately 0.5 cc to 1.0 cc of grease into the Upper Spindle Bearing (104 or 105), Bevel Pinion Bearing (109) and Bevel Pinion Thrust Bearing (112). Apply 6 cc to 8 cc of grease to the Matched Bevel Gear Set (107) used in 7L3A4 Angle Attachments, 2 cc to 4 cc of grease to the Matched Bevel Gear Set used in 7L2A4 Angle Attachments and a maximum of 0.5 cc of grease to the bevel gears of the Spindle Assembly (108) used in 7L1A1 Angle Attachments.
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### Disassembly

#### General Instructions

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
3. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
4. Do not disassemble the tool unless you have a complete set of new gaskets and O-rings for replacement.

#### Disassembly of Angle Attachment

1. Remove the Drill Chuck by inserting the short leg of a 1/4" hex key into the Chuck and tightening the Chuck. Rap the long leg of the key sharply with a hammer to remove the Chuck.
2. Carefully grasp the flats of the Coupling Nut (124) in copper-covered vise jaws, Angle Head (101) facing down.

#### NOTICE

##### Gear Case has left-hand threads.

3. Using a wrench on the flats of the Gear Case (44), loosen but do not remove the Gear Case from the Coupling Nut. Remove the tool from the vise. Unscrew and remove the Coupling Nut from the Gear Case.
4. Carefully grasp the Angle Head (101) in leather-covered or copper-covered vise jaws, Spindle (108 or 122) facing upward.

#### NOTICE

##### Spindle Bearing Cap (121) has left-hand threads.

5. For 7L1A1 Angle Head, using a wrench, remove the Spindle Bearing Cap.

#### NOTICE

**Do not remove the Spindle from the Angle Head until the bevel pinion of the Spindle Assembly (108) is pulled outward against the Bevel Pinion Bearing (109). Failure to do so could damage the Spindle Upper Bearing (105). If tightness or binding occurs, check to make sure the bevel pinion has been pulled outward.**

#### NOTICE

##### Spindle Bearing Cap has left-hand threads.

**For 7L2A4 Angle Head,** use a wrench to remove the Spindle Bearing Cap (121). Withdraw the Spindle (122) from the Angle Head.

#### NOTICE

##### Spindle Bearing Cap has left-hand threads.

**For 7L3A4 Angle Head,** use No. 85A32-26 Bearing Cap Wrench to remove the Spindle Bearing Cap. Withdraw the Spindle (122) from the Angle Head.

6. Inspect the Lower Spindle Bearing (119) for looseness or roughness. If either of these conditions exists, replace the bearing as follows:
  - a. **For 7L1A1 Angle Head,** slip the Lower Spindle Bearing from the Spindle.
  - b. **For 7L2A4 Angle Head,** grasp the threaded end of the Spindle in leather-covered or copper-covered vise jaws.
  - c. Unscrew the Bevel Gear Retainer (120) and lift off the Bevel Gear (107).
  - d. Press the Spindle from the Lower Spindle Bearing.
  - e. **For 7L3A4 Angle Head,** remove the Bevel Gear Retainer (120).
  - f. Press off the Bevel Gear. Press the Spindle from the Lower Spindle Bearing.

#### NOTICE

**Do not remove the Spindle Upper Bearing (105) unless you have a new bearing ready to install. This type of bearing is always damaged during the removal process.**

#### NOTICE

**7L3A4 Angle Head will require a new Angle Hosing Cap (103) when the Spindle Upper Bearing is installed.**

7. **For 7L1A1 Angle Head,** if the Spindle Upper Bearing appears rough or loose, press it off the Spindle.  
**For 7L2A4 or 7L3A4 Angle Head,** if the Spindle Upper Bearing (104) appears rough or loose, press it from the Angle Head.

- Remove the Bearing Seat Retainer (110) and slide off the Rear Thrust Bearing Seat (111), Bevel Pinion Thrust (112) and Front Thrust Bearing Seat (113) from the pinion shaft.
- For 7L2A4 Angle Head**, use snap ring pliers to remove the Pinion Bearing Spacer Retainer (114). Remove the Pinion Bearing Spacer (116).

**For 7L3A4 Angle Head**, use a thin blade screwdriver to pry out and under the tab of the Pinion Bearing Spacer Retainer (114). Rotate the screwdriver around the pinion shaft to spiral the retainer out of its groove. Using a hooked tool, reach into the Bevel Pinion Bearing Spacer (116) and hook the drilled cross-hole in the Spacer. Pull the Spacer from Angle Head.

#### NOTICE

**Do not remove the pinion shaft and bearing unless you have new bearing on hand.**

- Grasp the spline of the pinion shaft in leather-covered or copper-covered vise jaws and gently tap the rear face of the Angle Head with a soft hammer to pull the Bevel Pinion Bearing (109). After the Angle Head is disassembled, check all parts for damage or wear.

**For 7L1A1 Angle Head**, if the gear teeth on either the spindle or bevel pinion of the Spindle Assembly (108) are worn or chipped, replace both parts. They are furnished in a matched set and must be replaced with a matched set.

**For 7L2A4 or 7L3A4 Angle Head**, if the gear teeth on either of the Bevel Gears (107) are worn or chipped, replace both parts. They are furnished in a matched set and must be replaced with a matched set.

#### Disassembly of the Gearing

- Being careful not to distort the Motor Housing (1), grasp the flats on the Housing in leather-covered or copper-covered vise jaws with the Gear Case (44) facing upward.
- Using a wrench on the flats of the Gear Case, loosen, but do not remove the Gear Case.

#### NOTICE

**Be certain to hold the tool over a workbench so that you will not lose any parts.**

- Remove the tool from the vise and, while holding the tool horizontally, carefully unscrew the Gear Case by hand and pull it away from the Motor Housing.
- Using snap ring pliers, remove the Gear Retainer (36).
- For H, J, M or P ratio**, the Rotor Pinion (37) may come out with the Gear Case, or it may have remained with the Rotor (23) when the Gear Case was removed. Remove the Rotor Pinion.
- For M, P or R ratio**, remove the Gear Head Planet Gear Assemblies (39) or Gear Head Planet Gears (41), Gear Head Planet Gear Bearings (42), Gear Head (38) and Gear Head Spacer (43).
- Remove the Spindle Planet Gear Assemblies (32) or Spindle Planet Gears (34) and Spindle Planet Gear Bearings (35).
- Position the Gear Case vertically in an arbor press, with the motor end down. Using a 7/16" (11 mm) diameter brass rod against the outer rim of the Spindle (29), press the Spindle from the Gear Case.
- Using snap ring pliers, remove the Spindle Bearing Retainer (49).
- Tap the externally threaded end of the Gear Case on a workbench

#### Assembly

##### General Instructions

- Always press on the **inner** ring of a ball-type bearing when installing the bearing on a shaft.
- Always press on the **outer** ring of a ball-type bearing when pressing the bearing into a bearing recess.
- Unless otherwise noted, always press on the stamped end of a needle bearing when installing the needle bearing in a recess.
- Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws. Take extra care with threaded parts and housings.
- Always clean every part and wipe every part with a thin film of oil

to remove the Grease Shield (46) and Spindle Bearing (48).

- Remove the Seal Support (30) from the Spindle.
- If the Grease Shield Retainer (47) must be removed, insert a thin blade screwdriver under the tab, and using a rotary motion, spiral the Retainer out of the groove in the Gear Case.

#### Disassembly of the Motor and Throttle

- Using a pin punch and hammer, drive the Throttle Lever Pin (4) out of the Rear Muffler (12) to release the Throttle Lever (3).
- Grasp the splined end of the Rotor (23) in leather-covered or copper-covered vise jaws and pull the assembled motor from the Motor Housing (1).
- Remove the Rear End Plate Gasket (18) from the Motor Housing.
- Using a wrench, unscrew and remove the Rear Rotor Bearing Retaining Nut (19).
- Remove the Rotor from the vise and remove the Bearing Thrust Washer (20), Rear End Plate (22), Cylinder (25) and Vanes (24).
- Check the Front Rotor Bearing (28) for damage or roughness. If replacement is necessary, support the Front End Plate (26) between two blocks of wood on the table of an arbor press. Press the Rotor from the Front Rotor Bearing. Using a flat face punch on the inner ring, tap the Bearing out of the End Plate.
- Check the Rear Rotor Bearing (21) for damage or roughness. If replacement is necessary, use a flat face punch on the inner ring and tap the Bearing out of the End Plate.
- Being careful not to distort the Housing, grasp the flats on the Motor Housing in leather-covered or copper-covered vise jaws with the inlet upward.
- Using a wrench on the flats, unscrew and remove the Inlet Bushing (16) and the Air Strainer Screen (17).
- Remove the Throttle Valve Spring (9).
- Remove the Rear Muffler (12), Inlet Bushing Spacer (15), two Exhaust Silencers (14), Muffler Element (13), Exhaust Deflector Seal (11) and the Silencer Seal Ring (10).
- Lift out the Throttle Valve (8) and Throttle Plunger Assembly (5).
- Remove the Throttle Plunger Seal (6) from the Throttle Plunger.

#### NOTICE

**Only remove the Throttle Valve Seat (7) when replacing it or when the Throttle Plunger Bushing (2) must be replaced.**

- To remove the Throttle Valve Seat, insert a wire hook through the central hole of the Seat and hooking the underside of the Seat; pull the Seat out of the Motor Housing.
- Before removing the Throttle Plunger Bushing (2) all seals and components must be removed from the Motor Housing. To remove the Throttle Plunger Bushing, proceed as follows:
  - Grasp the rear hub of the Motor Housing in leather-covered or copper-covered vise jaws with the Throttle Plunger Bushing upward.



#### CAUTION

**Apply enough heat to warm the Housing, but not enough heat to distort it.**

- To start a torch, apply heat to the Motor Housing around the Bushing.
- Thread a 5/16"-18 tap into the Bushing and pull the Bushing out of the Housing with the tap.

before installation.

- Apply a film of O-ring lubricant to all O-rings before final assembly.
- Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in a suitable cleaning solution and dry with a clean cloth. **Sealed or shielded bearing should never be cleaned.** Work grease thoroughly into every open bearing before installation.

#### Assembly of the Motor and Throttle

- If the Throttle Plunger Bushing (2) was removed, proceed as follows:
  - Insert the Throttle Plunger Bushing into the Motor Housing (1)

- to a depth approximately one-half the length of the Bushing.
- b. Put a few drops of a quality sealant in the counterbore surrounding the outside diameter of the Bushing.
  - c. Rotate the Bushing approximately 180° to make certain the sealant makes complete contact around the outside of the Bushing.
  - d. Push the Bushing into the Housing until it bottoms against the shoulder inside the Housing.
  - e. Allow the sealant to cure for eight hours at room temperature.
2. Carefully grasp the flats on the Motor Housing (1) in leather-covered or copper-covered vise jaws, inlet end facing upward.
  3. If the Throttle Valve Seat (7) was removed, use a flat-faced rod 1/2" (12.7 mm) in diameter by 3" (76 mm) long to push the Seat into the Motor Housing until it seats.
  4. Install the Throttle Plunger Seal (6) in the groove of the Throttle Plunger (5).
  5. Insert the Throttle Plunger into the Plunger Bushing and rotate the Plunger until the hole in the Plunger aligns dead center with the hole in the Throttle Valve Seat.
  6. Using needle nose pliers to hold the short-stem end of the Throttle Valve (8), install the Valve inserting the long stem end through the hole in the Throttle Valve Seat and Throttle Plunger.
  7. After folding the Muffler Element (13) lengthwise, and with the fold trailing, install the Element by wrapping it horseshoe fashion around the inside of the Rear Muffler (12) covering all exhaust holes.
  8. Install the Exhaust Deflector Seal (11) into the groove on the front end of the Rear Muffler.
  9. Install the two Exhaust Silencers (14) over the hub at the rear of the Motor Housing and work the Silencers into the Housing.
  10. Install the Silencer Seal Ring (10) over the hub of the Motor Housing approximately halfway down the hub.

#### NOTICE

**Tabs on the Rear Muffler match notches on the Motor Housing. Do not force the Muffler into place.**

11. Install the Rear Muffler over the hub of the Motor Housing, aligning the wide tab on the Rear Muffler with the throttle plunger hole in the Motor Housing.
12. Insert the Air Strainer Screen (17), closed end first, inside the external threaded end of the Inlet Bushing (16).
13. Insert the Throttle Valve Spring (9), large coil end first, into the Inlet Bushing making sure it contacts the Air Strainer Screen.
14. Install the Inlet Bushing Spacer (15) in the large hole in the Rear Muffler.
15. Thread the Inlet Bushing into the Motor Housing, making certain the Throttle Valve Spring encircles the short-stem end of the Throttle Valve. Tighten the Inlet Bushing to a minimum of 26 ft-lb (35 Nm) torque. The Inlet Bushing must securely clamp the Rear Muffler.
16. Note that the throttle lever pinhole in the Rear Muffler is larger at one end than the other. Install the Throttle Lever (3), pressing the Throttle Lever Pin (4) into the large end of the pinhole.
17. Using a sleeve that contacts the outer ring of the Rear Rotor Bearing (21), press the Rear Rotor Bearing into the Rear End Plate (22).

#### NOTICE

**The Rotor must spin freely while holding the End Plate.**

18. Place the Rear End Plate, Bearing end trailing, on the threaded hub of the Rotor (23). Insert a 0.001" feeler gauge or shim between the face of the Rotor and the End Plate. Place the Bearing Thrust Washer (20) on the threaded hub of the Rotor. Thread the Rear Rotor Bearing Retaining Nut (19) onto the hub of the Rotor and tighten it until the feeler gauge has a slight drag during removal.
19. Lightly grasp the threaded hub of the Rotor in leather-covered or copper-covered vise jaws with he splined hub upward.
20. Wipe each Vane (24) with a film of light oil and place a Vane in each slot in the Rotor.

21. Looking down the axis of the Rotor and Cylinder (25), position the Cylinder over the Rotor with the cylinder dowel hole at twelve o'clock, the notch in cylinder face at ten o'clock and the two slots in the side of the Cylinder at two o'clock. Place the Cylinder down over the Rotor and Vanes and against the Rear End Plate.
22. Push the Front Rotor Bearing (28) into the recess in the Front End Plate (26).

#### NOTICE

**Align the cylinder dowel hole in the Rear End Plate, Cylinder and Front End Plate before pressing the Bearing onto the shaft.**

23. Remove the assembled Rotor from the vise and using a sleeve that contacts the inner ring of the Front Rotor Bearing, press the Bearing, flat side of the Front End Plate first, onto the rotor shaft. After pressing the bearing onto the shaft, lightly rap the end of the splined hub with a plastic hammer to relax the load on the Bearing. The Rotor must rotate in the Bearing without drag.
24. Position the Rear End Plate Gasket (18) in the bottom of the motor housing bore so that the dowel hole and air inlet port in the Gasket align with the dowel hole and air inlet in the housing bore face.
25. Using an assembly dowel 3/32" in diameter by 10" long (2.3 mm x 254 mm), align the dowel holes in the Front End Plate, Cylinder and Rear End Plate. Insert the assembly rod through the aligned holes so that about 3" (76 mm) of the rod extends beyond the Rear End Plate. Insert the extension into the dowel hole at the bottom of the housing bore, and slide the motor into the Motor Housing until it seats.
26. Withdraw the assembly dowel and insert the Cylinder Dowel (27) until the Cylinder Dowel is slightly below the surface of the Front End Plate.

#### Assembly of the Gearing

1. If the Grease Shield Retainer (47) was removed, install it in the second groove below the front face of the Gear Case (44).
2. Support the face of the Spindle (29), pin end downward, on the table of an arbor press.
3. **For H, J or JJ ratio**, install the Seal Support (30), large end first, and Grease Shield (46) over the hub of the Spindle.  
**For K, L, M, P or R ratio**, install the Seal Support (30), large end first and Grease Shield (46) over the hub of the Spindle.
4. Using a sleeve that contacts the inner ring of the Bearing, press the Spindle Bearing (48) onto the hub of the Spindle until the Bearing seats against the Seal Support.
5. Insert the assembled Spindle, pin end first, into the front end of the Gear Case until the Grease Shield is flush against the Grease Shield Retainer.
6. Using snap ring pliers, install the Spindle Bearing Retainer (49) in the groove ahead of the Spindle Bearing.
7. **For H ratio**, push the Spindle Planet Gear Bearings (35) into the Spindle Planet Gears (34).
8. **For H ratio**, grease the assembled Spindle Planet Gears and Bearings and install them on the pins of the Spindle.  
**For J, JJ, K, L, M, P or R ratio**, grease the bearings and gears of the Spindle Planet Gear Assemblies (32) and install them on the pins of the Spindle.
9. **For M, P or JJ ratio**, install the Gear Head Spacer (43) in the Gear Case against the Spindle Planet Gears.
10. **For M, P or R ratio**, grease the splined hub of the Gear Head (38) and insert it into the Gear Case. The splined hub must pass through the Gear Head Spacer and mesh with the teeth of the Spindle Planet Gears.
11. **For M ratio**, push the Gear Head Planet Gear Bearings (42) into the Gear Head Planet Gears (41).
12. **For M ratio**, grease the assembled Gear Head Planet Gears and Bearings and install them on the pins of the Gear Head.  
**For P or R ratio**, grease the bearings and gears of the Gear Head Planet Gear Assemblies (39) and install them on the pins of the Gear Head.
13. **For H or J ratio**, grease the Rotor Pinion (37) and install it in the

center of the Spindle Planet Gears. Make certain the teeth of the Pinion and Planet Gears mesh.

**For M or P ratio**, grease the Rotor Pinion (37) and install it in the center of the Gear Head Planet Gears. Make certain the teeth of the Pinion and Planet Gears mesh.

- Using snap ring pliers, install the Gear Retainer (36) in the shallow internal groove in the Gear Case behind the Spindle Planet Gears or Gear Head Planet Gears.
- Thread the assembled Gear Case onto the assembled Motor Housing until it is hand-tight. Make certain the gear teeth on the Spindle mesh with the gear teeth of the Rotor Pinion, Gear Head Planet Gears or Spindle Planet Gears.

### NOTICE

**Run the motor at free speed on low air pressure while final tightening the Gear Case. Listen while tightening to make certain the gears mesh properly.**

- Tighten the Gear Case between 30 to 35 ft-lb (41 to 47 Nm) torque.

### Assembly of the Angle Attachment

- Lubricate Bevel Pinion (107 or 108) as instructed in **Lubrication** and insert it, gear end first, into the long bore of Angle Head (101).
- Lubricate the Bevel Pinion Bearing (109) as instructed in **Lubrication** and insert it, unstamped end first, into the bore of the Angle Head, after the Bevel Pinion.
- For 7L1A1 Angle Head**, use No. 7L1A-950 Bearing Inserting Tool and press the Bevel Pinion Bearing so the stamped face is a maximum of 2.40" (61 mm) but not less than 2.38" (60.5 mm) below the end face of the Angle Head.  
**For 7L12A4 Angle Head**, use No. 7L2A-950 Bearing Inserting Tool and press the Bevel Pinion Bearing so the stamped face is a maximum of 1.65" (42.0 mm) but not less than 1.64" (41.75 mm) below the end face of the Angle Head.  
**For 7L3A4 Angle Head**, use No. 7L3A-950 Bearing Inserting Tool and press the Bevel Pinion Bearing so the stamped face is a maximum of 1.35" (34.4 mm) but not less than 1.34" (34.1 mm) below the end face of the Angle Head.

### NOTICE

**Check to make sure the Pinion Bearing Spacer Retainer (114) is completely seated.**

- For 7L2A4 Angle Head**, install the Bevel Pinion Bearing Spacer (116). Using snap ring pliers, install the Pinion Bearing Spacer Retainer.  
**For 7L3A4 Angle Head**, install the Bevel Pinion Bearing Spacer over the splined end of the Bevel Pinion and into the Angle Head until it is beyond the spacer retainer groove. Using a thin blade screwdriver, start the end of the Pinion Bearing Spacer Retainer opposite the tab end into the groove of the Angle Head. Rotate the screwdriver around the pinion shaft to spiral the Retainer into the groove.
- Lubricate the Bevel Pinion Thrust Bearing (112) as instructed in **Lubrication**. Install in order named the Front Thrust Bearing Seat (113), Bevel Pinion Thrust Bearing, and Rear Thrust Bearing Seat (111) over the splined end of the Bevel Pinion and retain with the Bearing Seat Retainer (110).
- If the Lower Spindle Bearing (119) has been removed, proceed as follows:
  - For 7L2A4 Angle Head**, using a sleeve that will contact only the inner ring of the Bearing, press the Lower Spindle Bearing, sealed side first, onto the Spindle (122).
  - For 7L3A4 Angle Head**, using a sleeve that will contact only the inner ring of the Bearing, press on the stamped face of the Bearing, red side toward the shoulder on the Spindle.
- For 7L2A4 Angle Head**, slide the Bevel Gear (107) onto the Spindle.  
**For 7L3A4 Angle Head**, press the Bevel Gear onto the Spindle.
- For 7L2A4 Angle Head**, apply a thread-locking primer to the thread on the Bevel Gear Retainer (120) and Spindle. Allow the primer to cure for five minutes. Apply a quality thread-locking compound to the thread on the Bevel Gear Retainer and tighten

it on the Spindle to 10 ft-lb (13.5 Nm) torque.

**For 7L3A4 Angle Head**, spread the Bevel Gear Retainer (120) and slip it over the end of the Spindle. Slide the Retainer down the Spindle and into the groove of the Spindle to retain the Bevel Gear.

- If the Spindle Upper Bearing (104 or 105) was removed, install a new Bearing as follows:
  - For 7L1A1 Angle Head**, apply a small drop of a quality sealant to the small outside diameter of the Upper Spindle Bearing Shaft.

### CAUTION

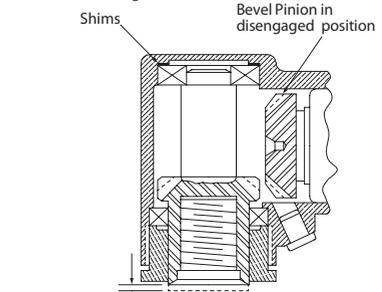
**Do not get any sealant in the bearing; damage to the bearing could result.**

- Press the Spindle Upper Bearing (105) onto the Spindle (108) and allow the sealant to dry for a minimum of 10 minutes.

### NOTICE

**Make sure the Bevel Pinion (108) is pulled outward toward the Bevel Pinion Bearing before inserting the Spindle into the Angle Head.**

- Insert the Spindle into the Angle Head until the Upper Spindle Bearing seats into the recess of the Angle Head.
- Slip the Lower Spindle Bearing over the end of the Spindle and into the Angle Head recess.
- Install the Spindle Bearing Cap (121) finger tight.
- Spindle must turn freely.
- With the Bevel Gear out of mesh with the Bevel Pinion, measure the axial play of the Spindle (use  $\pm 0.25$  lb loads). Subtract 0.002" (.051 mm) from the reading for required shim thickness. (See Dwg. TPD682-1)



Axial play  
Shim to 0.001 Min.  
0.003 Max.

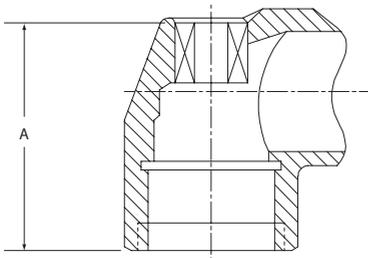
(Dwg. TPD682-1)

- Unscrew and remove the Spindle Bearing Cap. While pulling the Bevel Pinion outward toward the Bevel Pinion Bearing (109), remove the Spindle from the Angle Head.

### NOTICE

**Shim Packet contains three 0.002" (0.05 mm) shims and two 0.005" (.13 mm) shims.**

- Insert the required number of shims, as determined from step (g), into the upper bearing recess of the Angle Head.  
**Reassemble and test the Angle lead as indicated in steps (c) through (f).**
- For 7L2A4 Angle Head**, press on the closed end of a new Spindle Bearing entering the Bearing into the small bore opposite the threaded end of the Angle Head to the dimension shown in Dwg. TPD680.



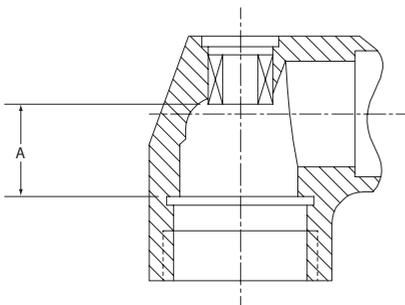
(Dwg. TPD680)

Minimum Dimension "A"		Maximum Dimension "A"	
in	mm	in	mm
1.21	30.75	1.27	31.25

- k. **For 7L3A4 Angle Head**, press a new Spindle Bearing into the Angle Head from the large threaded end to the dimension shown in Dwg. TPD636.

**CAUTION**

**Press on the stamped face of the Bearing. Failure to do so will cause damage to the Bearing. Install a new Angle Housing Cap (103) into the top of the Angle Head.**



(Dwg. TPD636)

Minimum Dimension "A"		Maximum Dimension "A"	
in	mm	in	mm
0.718	18.25	0.728	18.50

- Lubricate the Spindle Upper Bearing, Bevel Gear and Lower Spindle Bearing as instructed in **Lubrication** and install the Spindle into the Angle Head.
- Clean the threads on the Angle Head and the Spindle Bearing Cap (121), apply a film of Vibra-Tite®\*\*\* VC3 to the threads.
- For 7L1A1 Angle Head**, tighten the Spindle Bearing Cap to a minimum of 35 in-lb (3.9 Nm) torque.  
**For 7L2A4 Angle Head**, install the Spindle Bearing Cap and tighten the Cap to a minimum of 15 ft-lb (20.3 Nm) torque.  
**For 7L3A4 Angle Head**, using No. 85A32-26 Bearing Cap Wrench, install the Spindle Bearing Cap and tighten the Cap to a minimum of 25 ft-lb (34 Nm) torque.
- Slide the Coupling Nut (124), threaded end trailing, over the splined end of the Angle Head.
- Apply the Coupling Nut Retainer (123) to the external groove on the splined end of the Angle Head.
- Engage the spline on the Bevel Pinion with the matching spline in the Spindle (29) and thread the Coupling Nut onto the Gear Case. Tighten the Coupling Nut to a minimum of 25 ft-lb (34 Nm) torque. Check to make sure the Angle Head (101) aligns with the Throttle Lever (3).
- For 7L2A4 or 7L3A4 Angle Head**, thread the Drill Chuck onto the Spindle and tighten.

## Troubleshooting Guide

Trouble	Probable Cause	Solution
Loss of power	Low air pressure	Check air supply. For top performance, the air pressure must be 90 psig (6.2 bar/620 kPa) at the inlet.
	Plugged Air Strainer Screen or Inlet Screen	Clean the Air Strainer Screen in a clean, suitable cleaning solution. If the Screen cannot be cleaned, replace it.
	Clogged Muffler or Exhaust Silencer	Clean the Muffler Element in a clean, suitable cleaning solution. If it cannot be cleaned, replace it.
	Worn or broken Vanes	Replace the <b>complete</b> set of Vanes.
	Damaged Rear End Plate Gasket	Install a new Rear End Plate Gasket.
	Worn or broken Cylinder	Replace the Cylinder if it is cracked or if the bore appears wavy or scored.
	Improper lubrication or dirt build-up	Clean the Motor Unit parts and lubricate as instructed.

<b>Trouble</b>	<b>Probable Cause</b>	<b>Solution</b>
Leaky Throttle Valve	Worn Throttle Valve and/or Throttle Valve Seat	Install a new Throttle Valve and or a Throttle Valve Seat.
	Dirt accumulation on Throttle Valve and/or Throttle Valve Seat	Pour about 3 cc of a clean, suitable cleaning solution in the air inlet and operate the tool for about 30 seconds. <b>Immediately</b> pour 3 cc of light oil in the air inlet and operate the tool for 30 seconds to lubricate all the cleaned parts.
Gear Case gets hot	Excessive grease	Clean and inspect the Gear Case and gearing parts and lubricate as instructed.
	Worn or damaged parts	Clean and inspect the Gear Case and gearing. Replace worn or broken components.

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<b>Trouble</b>	<b>Probable Cause</b>	<b>Solution</b>
Angle Head gets hot	Excessive grease	Clean and inspect the angle and gearing parts. Lubricate as instructed.
	Inadequate grease	Inject 0.5 to 1.5 cc of grease into Grease Fitting (102).
	Worn or damaged parts	Clean and inspect the Angle Head and gearing. If the Bevel Gear and/or Bevel Pinion is broken, replace <b>both</b> parts as they are a matched set.

### Related Documentation

For additional information refer to:  
Product Safety Information Manual 04580353.  
Product Information Manual 03534666.  
Parts Information Manual 45612710.

Manuals can be downloaded from [ingersollrandproducts.com](http://ingersollrandproducts.com)

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