



45612751
Edition 1
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Air Angle Wrench

6W Series

Maintenance Information



Save These Instructions

 **Ingersoll Rand**

WARNING

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

Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool or before performing any maintenance on this tool.

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

Lubrication

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

1. Work approximately 1.5 cc of **Ingersoll Rand** No. 67 Grease into the Rear Rotor Bearing (35), Front Rotor Bearing (42), and the Spindle Bearing (61).
2. Work 6 cc to 8 cc of **Ingersoll Rand** No. 67 Grease into the L ratio gear train and 10 cc to 12 cc of the grease into the gear train of all other ratios. Grease the Planet Gear Bearings (47, 52, and 54), the gear teeth inside the Gear Case (56) and the planet gear shafts on the Spindle (43) and the Gear Head (50).
3. Work 0.5 cc to 1.0 cc of **Ingersoll Rand** No. 67 Grease into the Lower Spindle Bearing (113).
4. Work 0.5 cc to 1.0 cc of **Ingersoll Rand** No. 67 Grease into the Upper Spindle Bearing (104), Bevel Pinion Bearing (106), and Bevel Pinion Thrust Bearing (112). Apply 2 cc to 3 cc of the Grease to the Matched Bevel Gear Set used in 6L2D6 Angle Attachments.

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 the Angle Attachment

1. Carefully clamp the flats of the Coupling Nut (122) in leather-covered or copper-covered vise jaws, with the Angle Housing Assembly (101) facing downward.

NOTICE

The Gear Case (56) has left-hand threads.

2. Using a wrench on the flats of the Gear Case, loosen the Gear Case from the Coupling Nut. Remove the tool from the vise. Unscrew and remove the Coupling Nut from the Gear Case.
3. Carefully grasp the Angle Housing Assembly in leather-covered or copper-covered vise jaws with the Spindle (118) facing upward.

NOTICE

The Spindle Bearing Cap (120) has left-hand threads.

4. Using No. 85A32-26 or No. 141A12-26 Lower Bearing Cap Wrench, unscrew and remove the Spindle Bearing Cap.
For 6L2D6, remove the Spindle Seal (120A). Withdraw the Socket Adapter Spindle Assembly (118) from the Angle Housing.
5. Inspect the Lower Spindle Bearing (113) for looseness or roughness. If either of these conditions exists, replace the Bearing as follows:

For 7L3D6 Angle Head

- a. Remove the Bevel Gear Retainer (114).
- b. Press the Bevel Gear (105) from the Spindle.
- c. Press the Lower Spindle Bearing from the Spindle.

For 6L2D6 Angle Head

- a. Grasp the square drive end of the Spindle in leather-covered or copper-covered vise jaws.
- b. Unscrew the Bevel Gear Retainer (114) and lift the Bevel Gear (105) off the Spindle.
- c. Press the Lower Spindle Bearing from the Spindle.

NOTICE

Do not remove the Upper Spindle Bearing (104) unless you have a new Bearing ready to install. This type of Bearing is always damaged during the removal process.

NOTICE

The 7L3D6 Angle Head will require a new Angle Housing Cap (103) when the Upper Spindle Bearing is installed.

6. If the Upper Spindle Bearing appears rough or loose, press it from the Angle head.
7. Remove the Bearing Seat Retainer (108) and slide off the Rear Thrust Bearing Seat (107), Bevel Pinion Thrust Bearing (112) and Front Thrust Bearing Seat (109) from the pinion shaft.
8. **For 7L3D6 Angle Head**, use a thin blade screwdriver to pry out and under the tab of the Bearing Spacer Retainer (111). 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 (115) and hook the drilled cross-hole in the Spacer. Pull the Spacer from the Angle Housing.
For 6L2D6 Angle Head, use snap ring pliers to remove the Bearing Spacer Retainer (111). Remove the Pinion Bearing Spacer (110).

NOTICE

Do not remove the Bevel Pinion (105) and Bevel Pinion Bearing (106) unless you have a new Bearing on hand. After the Angle Attachment is disassembled, check all parts for damage or wear.

NOTICE

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.

9. Grasp the spline of the pinion shaft in leather-covered or copper-covered vise jaws and while gently tapping the rear face of the Angle Attachment with a soft hammer, pull the Bevel Pinion and Bevel Pinion Bearing from the Angle Attachment.

Disassembly of the Gearing

1. 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 (56) facing upward.
2. 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 as the Gear Case and the Motor Housing are separated.

- 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 (48).
- For M, N or P ratio**, the Rotor Pinion (49) may come out with the Gear Case, or it may have remained with the Rotor (37) when the Gear Case was removed. Remove the Rotor Pinion.
- For M, N, P, Q or R ratio**, remove the Gear Head Planet Gear Assembly (51), Gear Head (50) and Gear Head Spacer (55).
- Remove the Spindle Planet Gear Assembly (46).
- 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 (43), press the Spindle from the Gear Case.
- Tap the externally threaded end of the Gear Case on a workbench to remove the Spindle Bearing (61) and Grease Shield (59).
- Remove the Seal Support (44) from the Spindle.
- If the Grease Shield Retainer (60) 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.
- For 6WT or 6WRT**, spread the ends of the Deflector Retaining Ring (66) and remove it from the Gear Case.
- For 6WT or 6WRT**, slide the Exhaust Deflector (64) off the Gear Case and remove the Muffler Element (63) and two Exhaust Deflector Seals (65).

Disassembly of the Motor and Throttle

- Using a pin punch and hammer, drive the Throttle Lever Pin (5) out of the Rear Muffler (14) to release the Throttle Lever (4).
- Grasp the splined end of the Rotor (37) in leather-covered or copper-covered vise jaws and pull the assembled motor from the Motor Housing (1).
- Remove the Rear End Plate Gasket (33) from the Motor Housing.
- Using a wrench, unscrew and remove the Rear Rotor Bearing Retaining Nut (34).
- Remove the Rotor from the vise and remove the Bearing Thrust Washer (34A), Rear End Plate (36), Cylinder (39) and Vanes (38).
- Check the Front Rotor Bearing (42) for damage or roughness. If replacement is necessary, support the Front End Plate (40) 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 (35) 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 (17).
- Remove the Throttle Valve Spring (11) and the Air Strainer Screen (18).
- Remove the Rear Muffler (14), Inlet Bushing Spacer (16), Muffler Element (15), Exhaust Deflector Seal (13) and the Silencer Seal Ring (12).
- Lift out the Throttle Valve (10) and Throttle Plunger Assembly.

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.
- Always clean every part and wipe every part with a thin film of oil before installation.

- Remove the Throttle Plunger Seal (7) from the Throttle Plunger (6).

NOTICE

Only remove the Throttle Valve Seat (8) 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 Throttle Valve Seat Support (9), pull the Support and Seat out of the Motor Housing.
- Before removing the Throttle Plunger Bushing (2), all seals and components must be removed from the Motor Housing.
 - For 6WRS or 6WRT**, remove the Reverse Valve. Refer to the section **Disassembly of the Reverse Valve**.
 - For 6WT or 6WRT**, remove the Shutoff Valve. Refer to the section **Disassembly of the Shutoff Valve**.
- 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.

- Using a torch, apply heat to the Motor Housing around the Bushing.
- For 6WS**, thread a 5/16"-18 tap into the Bushing and pull the Bushing out of the Housing with the tap.
 - For 6WT, 6WRS or 6WRT**, thread a No. 10-32 tap into the Bushing and pull the Bushing out of the Housing with the tap.

Disassembly of the Reverse Valve (for 6WRS or 6WRT)

- Using a 3/32" Allen Wrench, remove the Retainer Setscrew (22).
- Remove the Lock Pin Retainer (20).

NOTICE

Be careful not to lose the Reverse Valve Spring (23) when removing the Reverse Valve (19).

- For 6WRS**, hold the Motor Housing horizontally with the throttle plunger hole downward. While applying light inward pressure to the Reverse Valve, tap the top side of the Housing with a plastic hammer to dislodge the Reverse Valve Lock Pin (21). Remove the Reverse Valve Bushing Seal (3A).
 - For 6WRT**, hold the Motor Housing vertically with the motor end downward. While applying light inward pressure to the Reverse Valve, tap the inlet end of the Housing with a plastic hammer to dislodge the Reverse Valve Lock Pin (21).
- Withdraw the Reverse Valve from the Housing.

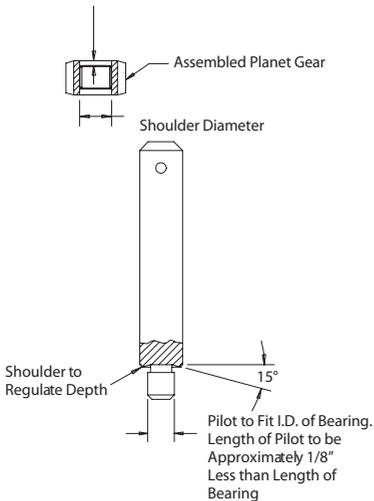
Disassembly of the Shutoff Valve (for 6WT or 6WRT)

- Using a wrench, loosen and remove the Regulator Body (27).
- With one hand over the Shutoff Valve opening, invert the Motor Housing and drop the Shutoff Valve (24) and Shutoff Valve Spring (26) out of the Housing.
- Using a pointed pick, remove the Regulator Body Seal (32) and the Shutoff Valve Stop (25) from the Housing.

- Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in a clean, suitable, cleaning solution and dry with a clean cloth. **Sealed or shielded bearings should not be cleaned.** Work grease into every open bearing before installation.
- Apply a film of O-ring lubricant to all O-rings before final assembly.
- Unless otherwise noted, always press on the stamped end of a needle bearing when installing a needle bearing into a recess. Use a bearing inserting tool similar to the one shown in Dwg. TPD488.

Needle Bearing Inserting Tool for Planet Gears

$$\text{Shoulder Length} = \frac{\text{Gear Length} - \text{Bearing Length}}{2}$$



(Dwg. TPC488)

Assembly of the Shutoff Valve (for 6WT or 6WRT)

- Using a wooden dowel, push the Shutoff Valve Stop (25) to the bottom of the Shutoff Valve opening.
- Install the Regulator Body Seal (32) in the groove near the bushing inside the Shutoff Valve opening.

NOTICE

Make certain the Shutoff Valve Spring (26) seats in the Shutoff Valve (24) recess.

- Insert the Shutoff Valve Spring and the Shutoff Valve into the Motor Housing (1).
- Screw the Regulator Body (27) into the Housing and tighten it to 12 to 15 ft-lb (16 to 20 Nm) torque.

Assembly of the Reverse Valve (for 6WRS or 6WRT)

- For 6WRS**, install the Reverse Valve Bushing Seal (3A).
- Insert the Reverse Valve Lock Pin (21) into the hole in the side of the Reverse Valve (19).
- Slip the Reverse Valve Spring (23) into the end of the Reverse Valve opposite the Reverse Valve knob.

NOTICE

If the Reverse Valve comes out of the Housing, the Lock Pin did not enter the L-shaped slot.

- Holding the Reverse Valve with the Lock Pin upward, align the L-shaped slot inside the reverse valve bushing with the Lock Pin. Slide the Reverse Valve into the bushing until the Reverse Valve Spring is partially compressed. Rotate the assembled Housing and Valve one-half turn (180°) and tap the Housing opposite the Lock Pin with a plastic hammer until the Lock Pin drops into the L-shaped slot. Slowly release the Reverse Valve.
- Install the Lock Pin Retainer (20) and Retainer Setscrew (22) in the end of the Reverse Valve. The Setscrew must not protrude from the Reverse Valve.
- Operate the Reverse Valve to make certain it functions properly.

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.
 - Put a few drops of Permabond** sealant in the counterbore surrounding the outside diameter of the Bushing.
 - Rotate the Bushing approximately 180° to make certain the sealant makes complete contact around the outside of the Bushing.
 - Push the Bushing into the Housing until it bottoms against the shoulder inside the Housing.
 - Allow the sealant to cure for eight hours at room temperature.
- Carefully grasp the flats on the Motor Housing (1) in leather-covered or copper-covered vise jaws, inlet end facing upward.
- If the Throttle Valve Seat (8) and Throttle Valve Seat Support (9) were removed, use a flat-faced rod 1/2" (12.7 mm) in diameter by 3" (76 mm) long to push the Seat Support into the Motor Housing until it seats. Use the same rod to push the Valve Seat into the Housing until it seats against the Seat Support.
- Install the Throttle Plunger Seal (7) in the groove of the Throttle Plunger (6).
- 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.
- Using needle nose pliers to hold the short-stem end of the Throttle Valve (10), install the Needle Inserting the long stem end through the hole in the Throttle Valve Seat and Throttle Plunger.
- After folding the Muffler Element (15) lengthwise, and with the fold trailing, install the Element by wrapping it horseshoe fashion around the inside of the Rear Muffler (14) covering all exhaust holes.
- Install the Exhaust Deflector Seal (13) into the groove on the front end of the Rear Muffler.
- Install the Silencer Seal Ring (12) 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.

- 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.
- Insert the Air Strainer Screen (18), closed end first, inside the Inlet Bushing (17).
- Insert the Throttle Valve Spring (11), large coil end first, into the Inlet Bushing making sure it contacts the Air Strainer Screen.
- Install the Inlet Bushing Spacer (16) in the large hole in the Rear Muffler.
- 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 26 ft-lb (35 Nm) torque. The Inlet Bushing must securely clamp the Rear Muffler.
- Note that the Throttle Lever pinhole in the Rear Muffler is larger at one end than the other. Install the Throttle Lever (4), pressing the Throttle Lever Pin (5) into the large end of the pinhole.
- If the Rear Rotor Bearing (35) was removed, use a sleeve that contacts the outer ring of the Rear Rotor Bearing, press the Rear Rotor Bearing into the Rear End Plate (36).

NOTICE

The Rotor (37) must spin freely while holding the Rear End Plate.

- Place the Rear End Plate, bearing end trailing, on the threaded hub of the Rotor. Insert a 0.001" feeler gauge or shim between the face of the Rotor and End Plate. Place the Bearing Thrust Washer (34A) on the threaded hub of the Rotor. Thread the Rear Rotor Bearing Retaining Nut (34) onto the hub of the Rotor and tighten it until the feeler gauge has a slight drag during removal.

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18. Lightly grasp the threaded hub of the Rotor in leather-covered or copper-covered vise jaws with the splined hub upward.
19. Wipe each Vane (38) with a film of **Ingersoll Rand** No. 10 Oil and place a Vane in each slot in the Rotor.
20. **For 6WS or 6WT**, looking down the axis of the Rotor and Cylinder (39), 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.
For 6WRS or 6WRT, place the Cylinder (39) down over the Rotor and Vanes and against the Rear End Plate.

NOTICE

Align the Cylinder Dowel hole in the Rear End Plate, Cylinder and Front End Plate (40) before pressing the Front Rotor Bearing (42) onto the shaft.

21. Push the Front Rotor Bearing into the recess in the Front End Plate.
22. 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.
23. Position the Rear End Plate Gasket (33) 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.
24. 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.
25. Withdraw the assembly dowel and insert the Cylinder Dowel (41) until the Cylinder Dowel is slightly below the surface of the Front End Plate.

Assembly of the Gearing

1. If the Grease Shield Retainer (60) was removed, install it in the second groove below the front face of the Gear Case (56).
2. Support the face of the Spindle (43), pin end downward, on the table of an arbor press.
3. Install the Seal Support (44), large end first, and Grease Shield (59) over the hub of the Spindle.
4. Using a sleeve that contacts the inner ring of the Bearing, press the Spindle Bearing (61) 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 (62) in the groove ahead of the Spindle Bearing.

NOTICE

Always press on the stamped end of the Spindle Planet Gear Bearings (47) and center the Bearing in the Gear.

7. If the Spindle Planet Gear Bearings are being replaced, use a bearing inserting tool, shown in Dwg. TPD488, and press the Bearings into the Spindle Planet Gears (46).
8. Grease the Bearings and Gears and install them on the pins of the Spindle.
9. **For M, N, P, Q, or R ratio**, install the Gear Head Spacer (55) in the Gear Case against the Spindle Planet Gears.
10. **For M, N, P, Q or R ratio**, grease the splined hub of the Gear Head (50) 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.

NOTICE

Always press on the stamped end of the Bearing and center the Gear Head Planet Gear Bearings (52) in the Gear.

11. **For N, P, Q or R ratio**, if the Gear Head Planet Gear Bearings (52) are being replaced, use a bearing inserting tool similar to the one used with the Spindle Planet Gear Bearings and press the Bearings into the Gear Head Planet Gears (51).
For M ratio, push the Gear Head Planet Gear Bearing (54) into the Gear Head Planet Gear (53).
12. **For M, N, P, Q or R ratio**, grease the Bearings and Gears and install them on the pins of the Gear Head.
13. **For M, N or P ratio**, grease the Rotor Pinion (49) and install it in the center of the Gear Head Planet Gears. Make certain the teeth of the Pinion and Planet Gears mesh.
14. Using snap ring pliers, install the Gear Retainer (48) in the shallow internal groove in the Gear Case behind the Spindle Planet Gears or Gear Head Planet Gears.
15. **For 6WT or 6WRT**, install the Exhaust Deflector (64) as follows:
 - a. Install the two Exhaust Deflector Seals (65) in the annular grooves on each side of the Muffler Element (63) recess on the Gear Case.

NOTICE

Make certain the hole through the Muffler Element aligns with the Grease Fitting (57) in the Gear Case.

- b. Wrap the Muffler Element around the Gear Case in the recess.
- c. Slip the Exhaust Deflector, largest inside diameter first, onto the front end of the Gear Case and over the Muffler Element and Exhaust Deflector Seals.
- d. Spread the ends of the Deflector Retaining Ring (66) and install it in the external groove in the Gear Case adjacent to the front of the Exhaust Deflector.
16. 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.

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

Assembly of the Angle Attachment

1. Lubricate the Bevel Pinion (105) as instructed under **LUBRICATION** and insert it, gear end first, into the long bore of the Angle Housing (101).
2. Lubricate the Bevel Pinion Bearing (106) as instructed under **LUBRICATION** and insert it, unstamped end first, into the bore of the Angle Housing and onto the bevel pinion shaft.
3. **For 7L3D6 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 Housing.
For 6L2D6 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 Housing.

NOTICE

Check to make sure the Bearing Spacer Retainer (111) is completely seated.

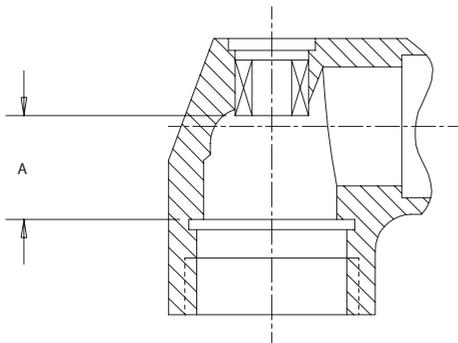
4. **For 7L3D6 Angle Head**, insert the Spacer Assembly over the splined end of the Bevel Pinion and into the Angle Housing until it is beyond the Spacer Retainer groove. Using a thin blade screwdriver, start the end of the Bearing Spacer Retainer opposite the tab end into the groove in the Angle Housing. Rotate the screwdriver around the pinion shaft to spiral the Retainer into the groove.
For 6L2D6 Angle Head, insert the Pinion Bearing Spacer over the splined end of the Bevel Pinion and into the Angle Housing until it is beyond the Spacer Retainer groove. Using snap ring pliers, install the Bearing Spacer Retainer in the groove in the Angle Housing.
5. Lubricate the Bevel Pinion Thrust Bearing (112) as instructed under **LUBRICATION**. Install, in the order named, the Front Thrust Bearing Seat (109), Bevel Pinion Thrust Bearing and Rear Thrust Bearing Seat (107) over the splined end of the Bevel Pinion and retain the components by installing the Bearing Seat Retainer (108) on the pinion shaft.
6. If the Lower Spindle Bearing (113) has been removed, proceed as follows:
 - a. **For 7L3D6 Angle Head**, using a sleeve that will contact the inner ring of the Bearing, press the Bearing onto the Spindle (118). Press on the stamped side of the Bearing with the side marked with red toward the spindle shoulder.
For 6L2D6 Angle Head, using a sleeve that will contact the inner ring of the Bearing, press the Bearing, sealed side first, onto the Spindle (118).
 - b. **For 7L3D6 Angle Head**, press the Bevel Gear (105) onto the Spindle.
For 6L2D6 Angle Head, slide the Bevel Gear (105) onto the Spindle.
 - c. **For 7L3D6 Angle Head**, spread the Bevel Gear Retainer (114) and slip it over the end of the Spindle. Slide the Retainer down the Spindle and into the groove around the Spindle to retain the Bevel Gear.
For 6L2D6 Angle Head, apply a quality thread-locking compound to the threads of the Bevel Gear Retainer and tighten it on the Spindle to 10 ft-lb (13.5 Nm) torque.

⚠ CAUTION

Press on the stamped face of the Upper Spindle Bearing (104). Failure to do so will cause damage to the Bearing.

7. If the Upper Spindle Bearing has been removed, proceed as follows:
For 7L3D6 Angle Head, press a new Spindle Bearing into the Angle Head from the large threaded end to the dimension shown. Install a new Angle Housing Cap (103) into the top of the Angle Head. See Dwg.TPD636.

Installation of the Spindle Bearing

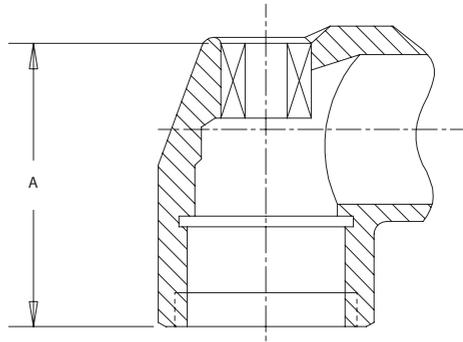


(Dwg. TPD636)

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

For 6L2D6 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.

Installation of the Spindle Bearing



(Dwg. TPD680)

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

8. Lubricate the Upper Spindle Bearing, Bevel Gear and Lower Spindle Bearing as instructed under **LUBRICATION** and install the Spindle in the Angle Housing.
9. Clean the threads on the Angle Housing and the Spindle Bearing Cap (120) and apply a film of Vibra-Tite*** VC3 to the threads.
10. **For 7L3D6 Angle Head**, using No. 8SA32-26 Lower Bearing Cap Wrench, install the Spindle Bearing Cap and tighten the Cap to a minimum of 25 ft-lb (34.0 Nm) torque.
For 6L2D6 Angle Head, install Spindle Seal (120A). Using No. 141A12-26 Lower Bearing Cap Wrench, install the Spindle Bearing Cap and tighten the Cap to a minimum of 15 ft-lb (120.0 Nm) torque.
11. Slide the Coupling Nut (122), threaded end trailing, over the splined end of the Angle Housing.
12. Apply the Coupling Nut Retainer (121) to the external groove on the splined end of the Angle Housing.
13. Engage the spline on the Bevel Pinion with the matching internal spline of the Spindle (43) and thread the Coupling Nut onto the Gear Case (56). Tighten the Coupling Nut to a minimum of 25 ft-lb (34.0 Nm) torque. Check to make sure the square drive of the Angle Attachment aligns with the Throttle Lever (4).

*** Registered trademark of N.D. Industries.

Troubleshooting Guide

Trouble	Probable Cause	Solution
Low power or low free speed	Low air pressure	Check the air pressure at the inlet. The pressure must not exceed 90 psig (6.2 bar/620 kPa).
	Plugged Inlet Bushing Screen or Air Strainer Screen	Clean the Screen in a clean, suitable, cleaning solution. If it cannot be cleaned, replace it.
	Worn or broken Vanes	Replace the complete set of Vanes.
	Loose Rotor Bearing Retaining Nut	Tighten the Nut.
	Worn or broken Cylinder	Replace the Cylinder if it is worn or broken or if the bore is scored or wavy.
	Scoring of End Plates	Replace End Plates if they are scored.
	Improper lubrication or dirt build-up in the motor.	Lubricate the Wrench as instructed in LUBRICATION . If lubrication does not result in satisfactory operation, disassemble the motor inspect and clean all parts.
Scoring	Improper assembly	Make certain that all motor or Cylinder parts are properly aligned prior to clamping the motor assembly.
Gear Case gets hot	Excessive grease	Clean and inspect the Gear Case gearing parts and lubricate as instructed in LUBRICATION .
	Worn or damaged parts	Clean and inspect the Gear Case and gearing. Replace worn or broken components.
Tool fails to shut off	Dirt or Burrs on Shutoff Valve or Bushing	Clean the parts and remove the burrs.
	Bleeder ports plugged	Clean the bleeder ports with a fine wire.
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. Immediately, pour 3 cc of the recommended oil in the air inlet and operate the tool for 30 seconds to lubricate all cleaned parts.

Related Documentation

For additional information refer to:

Product Safety Information Manual 04585006.

Product Information Manual 03533932.

Parts Information Manual 45612744.

Manuals can be downloaded from www.irttools.com.

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