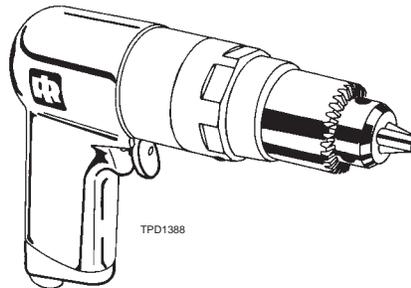


OPERATION AND MAINTENANCE MANUAL

for

SERIES 7 AIR DRILLS



⚠ WARNING

**IMPORTANT SAFETY INFORMATION ENCLOSED.
READ THIS MANUAL BEFORE OPERATING TOOL.**

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

- Always operate, inspect and maintain this tool in accordance with American National Standards Institute Safety Code for Portable Air Tools (ANSI-B186.1).
- For safety, top performance and maximum durability of parts, operate this tool at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet with 3/8" (10 mm) inside diameter air supply hose.
- Air 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.
- 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.
- Keep hands, loose clothing and long hair away from rotating end of tool.
- Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.
- Tool accessory may continue to rotate briefly after throttle is released.
- Do not lubricate tools with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.
- Use accessories recommended by Ingersoll-Rand.
- Always use a Dead Handle (47) with Models 7AN4 and 7AQ4.

NOTICE

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

Ingersoll-Rand is not responsible for customer modification of tools for applications on which Ingersoll-Rand was not consulted.

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

It is the responsibility of the employer to place the information in this manual into the hands of the operator.

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

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INGERSOLL-RAND®
PROFESSIONAL TOOLS

WARNING LABEL IDENTIFICATION



FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

PLACING TOOL IN SERVICE

LUBRICATION



Ingersoll-Rand No. 10. Ingersoll-Rand No. 28.

Always use an air line lubricator with these tools.

We recommend the following Filter-Lubricator-Regulator Unit:

For USA – No. C22-04-G00

For International – No. C26-04-A29

Motor

Before starting the tool and after each eight hours of operation, unless the air line lubricator is used, detach the air hose and inject 1.5 cc of Ingersoll-Rand No. 10 Oil into the air inlet.

For models with D, H, J, JJ, K, and L gearing, after each 50,000 cycles or one month of operation, whichever comes first, inject approximately 6 cc of Ingersoll-Rand No. 28 Grease into the Grease Fitting (39).

For models with M, N, or Q gearing, after each 50,000 cycles or one month of operation, whichever comes first, inject approximately 9 cc of Ingersoll-Rand No. 28 Grease into the Grease Fitting (39).

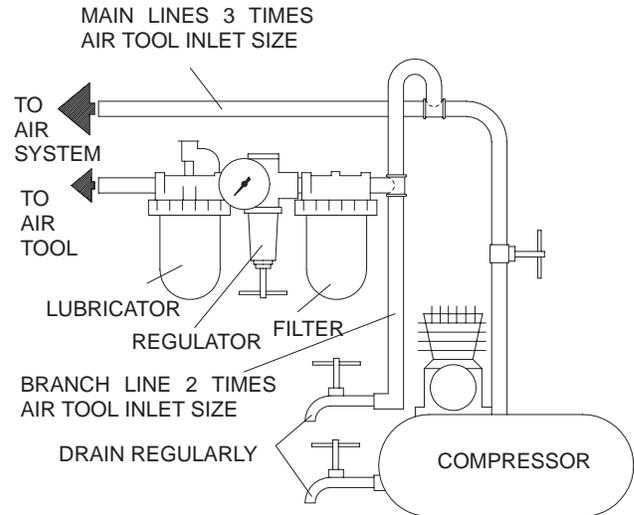
INSTALLATION

Air Supply and Connections

Always use clean dry air. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air tool.

Series 7 Air Drills are designed for drilling operations in the aerospace, automotive, appliance, electronic, machining and furniture industries.

An air line filter can greatly increase the life of an air tool. The filter removes dust and moisture. Low pressure (under 90 psig; 6.2 bar/620 kPa) reduces the speed of all air tools. Low air pressure not only wastes time, but also costs money. High air pressure (over 90 psig; 6.2 bar/620 kPa) raises performance beyond the rated capacity of the tool and could cause injury. Be sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905-1 for a typical piping arrangement.

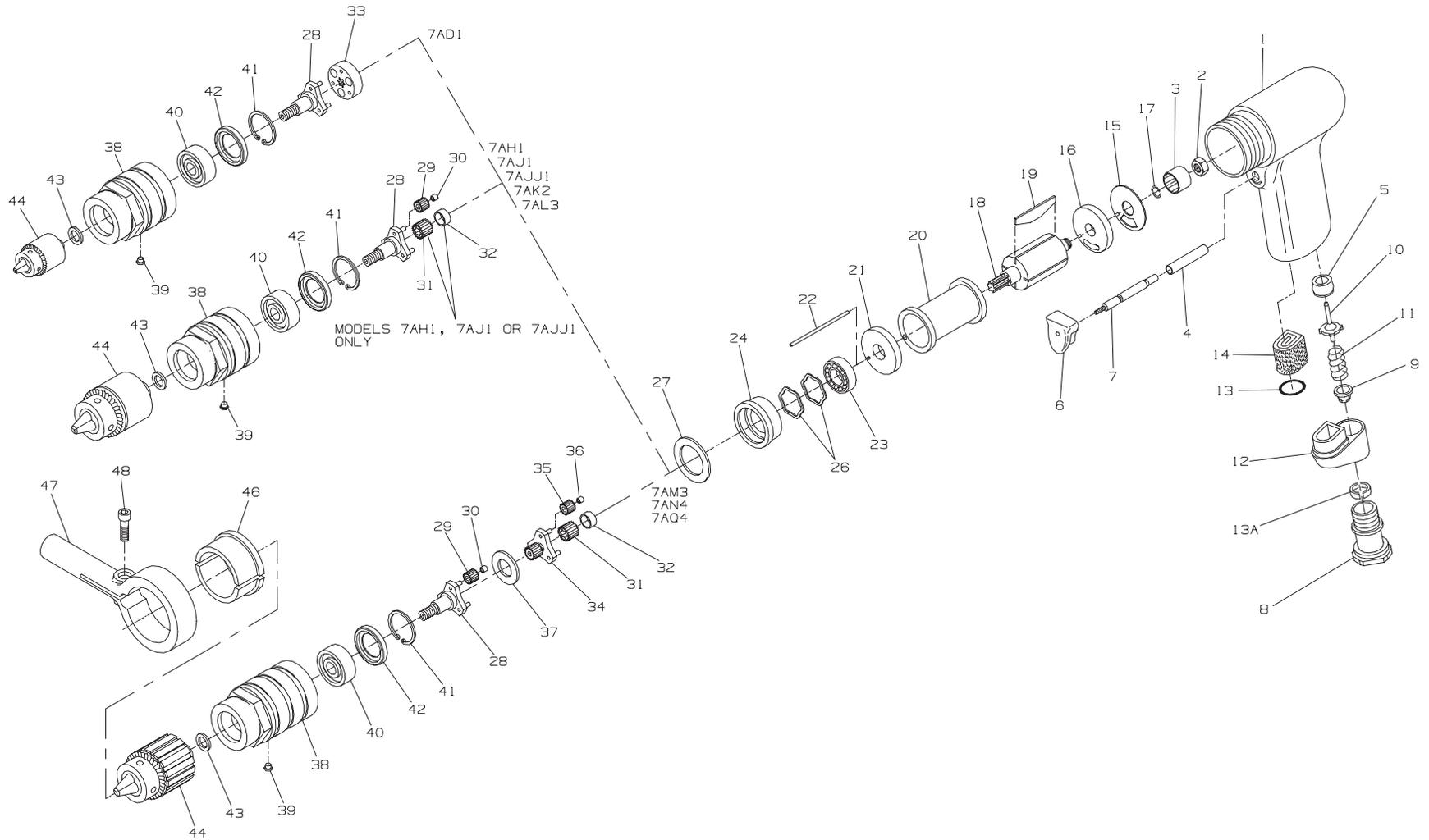


(Dwg. TPD905-1)

HOW TO ORDER AN AIR DRILL

PISTOL GRIP HANDLE

Model	Free Speed rpm	Chuck Capacity	
		in	mm
7AD1	20 000	1/4	6
7AH1	6 000	1/4	6
7AJ1	4 800	1/4	6
7AJJ1	4 000	1/4	6
7AK2	3 200	3/8	10
7AL3	2 400	3/8	10
7AM3	1 400	3/8	10
7AN4	900	1/2	13
7AQ4	600	1/2	13



MAINTENANCE SECTION

PART NUMBER FOR ORDERING



PART NUMBER FOR ORDERING



1	Motor Housing Assembly	7AH-A40A	26	Bearing Spring Washer (2)	7AH-278
*	Warning Label	WARNING-7-99	27	Bearing Housing Spacer	7AH-81
2	Bearing Nut	7AH-105A	28	Spindle	
◆•	Rear Rotor Bearing	7AH-24		for D or J ratio	7AJ-8A
4	Trigger Bushing	4RA-91		for H ratio	7AH-8
◆	Throttle Valve Seat	7AH-303		for K or N ratio	7AK-8
	Trigger Assembly	7AH-A93		for L ratio	7AL-8
6	Trigger	5RA-93		for M ratio	7AM-8A
7	Trigger Pin	7AH-94		for JJ or Q ratio	7AQ-8A
8	Inlet Bushing Assembly	7AH-A565	29	Spindle Planet Gear Assembly (3)	
◆•	Air Strainer Screen	R0A2-61		for H ratio (15 teeth)	7AH-A10
◆	Throttle Valve	7AH-302		for J or M ratio (18 teeth)	7AJ-A10
◆	Throttle Valve Spring	7AH-51		for K or N ratio (21 teeth)	7AK-A10
12	Muffler Assembly	3RA-A123		for L ratio (22 teeth)	7AL-A10
◆•	Muffler O-ring	85H-167		for JJ or Q ratio (19 teeth)	7AQ-A10
13A	Inlet Bushing Spacer	7AH-65	30	Spindle Planet Gear Bearing	
◆•	Muffler Element	7RA-311		(1 for each Gear)	
◆•	Rear End Plate Gasket	7AH-739		for H ratio	7AH-500
16	Rear End Plate	7AH-12		for J, JJ, M or Q ratio	7AJ-500
◆	Rear End Plate Retainer	7AH-118		for K, L or N ratio	7AK-500
18	Rotor			Rotor Pinion	
	for D, H, J, L, M or N ratio	7AH-53	31	for H, M or N ratio (22 teeth)	7AH-17
	for JJ ratio	7AJJ-53		for J ratio (16 teeth)	7AJ-17
	for K or Q ratio	7AK-53		for JJ ratio (13 teeth)	7AJJ-17
◆•	Vane Packet (set of 4 Vanes)	7AH-42A-4	32	Rotor Pinion Spacer	
20	Cylinder	7AH-3A		for H, J, M or N ratio	7AH-18
21	Front End Plate	7AH-11		for JJ ratio	7AJJ-18
22	Cylinder Dowel	7AH-98	33	Drive Plate (for D ratio)	7AD-171
◆•	Front Rotor Bearing	R1-22			
24	Front Rotor Bearing Housing	7AH-13			

* Not illustrated.

◆ Indicates Tune-up Kit part.

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

PART NUMBER FOR ORDERING



PART NUMBER FOR ORDERING



34	Gear Head		44	Drill Chuck	
	for M ratio (16 teeth)	7AM-216		0 to 1/4" capacity	R00A-99
	for N ratio (10 teeth)	7AN-216		0 to 5/16" capacity	6A-99
	for Q ratio (13 teeth)	7AQ-216		0 to 3/8" capacity	R1M-99
35	Gear Head Planet Gear Assembly (3)			5/64" to 1/2" capacity	R0K-99
	for M or N ratio (15 teeth)	7AH-A10	*	Chuck Key	
	for Q ratio (21 teeth)	7AP-A10		for R00A-99 Chuck	R00A-J253
36	Planet Gear Bearing (1 for each Gear)			for 6A-99 Chuck	R0J-J253
	(for M, N or Q ratio)	7AH-500		for R1M-99 Chuck	R1M-J253
37	Gear Head Spacer (for M, N or Q ratio)	7AN-80		for R0K-99 Chuck	R1T-J253
	Gear Case Assembly		46	Dead Handle Adapter (2)	7A-49
	for D, H, J, JJ, K or L ratio	7AH-A37A	+	47	Dead Handle
	for M, N or Q ratio	7AN-A37A		48	Pinch Bolt
38	Gear Case			*	Chuck Shield Kit (for D, H, J, JJ,
	for D, H, J, JJ, K or L ratio	7AH-B37A			or K ratio)
	for M, N or Q ratio	7AN-B37A		*	Nameplate
39	Grease Fitting	D0F9-879		*	Nameplate Screw
40	Spindle Bearing	5A-510		*	Warning Label (for N or Q ratio)
41	Spindle Bearing Retainer	7AH-28		*	Tune-up Kit (includes illustrated parts
42	Grease Shield	7AH-701			3, 5, 9, 10, 11, 13, 14, 15, 17, 19 and 23)
43	Chuck Spacer	5A-90		*	Exhaust Silencer
					7A-DRILLS-TK1
					7AH-310

* Not illustrated.

+ When ordering a Dead Handle (47), also order two Dead Handle Adapters (46).

MAINTENANCE SECTION

MAINTENANCE SECTION

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.

LUBRICATION

Each time the Series 7 Air Drill is 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 Ingersoll-Rand No. 28 Grease into the Rear Rotor Bearing (3), Front Rotor Bearing (23), and the Spindle Bearing (40).
3. **For D, H, J, JJ, or L gearing**, coat the gears with 6 cc of Ingersoll-Rand No. 28 Grease.
For M, N, or Q gearing, coat the gears with 9 cc of Ingersoll-Rand No. 28 Grease.

DISASSEMBLY

General Instructions

1. Do not disassemble the tool any further than necessary to repair or replace 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 Tool

1. Remove the Drill Chuck (44) by inserting the Chuck Key in one of the holes in the Chuck and rapping it sharply with a hammer.
2. Carefully grasp the handle of the Motor Housing (1) in leather-covered or copper-covered vise jaws so that the Spindle (28) is upward.
3. Using a wrench on the flats of the Gear Case (38), loosen the Gear Case. Remove the tool from the vise.

NOTICE

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

4. While holding the Drill horizontally, carefully unscrew the Gear Case by hand and pull it away from the Motor Housing.
5. **For D, H, J, JJ or K ratio**, hold the Gear Case horizontally, and lightly tap the end of the Spindle (28) with a plastic hammer to remove the Spindle and Spindle Planet Gears (29) from the Gear Case.
On H, J or JJ ratios there is also a Rotor Pinion (31) that may come out with the Spindle, or it may have remained with the Rotor (18) when the Gear Case was withdrawn.
6. **For M, N or Q ratio**, hold the Gear Case horizontally and lightly tap the end of the Spindle (28) with a plastic hammer to remove the Gear Head (34), Gear Head Planet Gears (35), Gear Head Spacer (37), Spindle (28) and Spindle Planet Gears (29). The Rotor Pinion (31) may come out with the Gear Head or it may have remained with the Rotor (18) when the Gear Case was withdrawn.
7. Withdraw the Spindle Planet Gears and/or Gear Head Planet Gears from the Spindle and/or Gear Head.
8. If it is necessary to remove the Spindle Bearing (40) from the front of the Gear Case, use a pair of internal snap-ring pliers to remove the Spindle Bearing Retainer (41).
9. Withdraw the Grease Shield (42) from the Gear Case.
10. Do not remove the Spindle Bearing (40) from the Gear Case unless it is absolutely necessary and you have a new bearing for a replacement. If you must remove the Spindle Bearing, use an arbor that will enter the front of the Gear Case and press the Spindle Bearing from the Gear Case.
11. **For H, J, JJ, M or N ratio**, if the Rotor Pinion (31) remained on the Rotor when the Gear Case was separated from the Housing, withdraw the Rotor Pinion along with the Rotor Pinion Spacer (32).
12. Remove the Front Rotor Bearing Housing (24) and the two Bearing Spring Washers (26).
13. Grasp the splined end of the Rotor and pull the assembled motor from the Motor Housing (1).

NOTICE

Make certain the Rear End Plate Retainer (17) doesn't spring away when it is slipped off the hub of the Rotor.

14. Using a pair of external snap-ring pliers with just the tips of the pliers inserted between the ends of the Rear End Plate Retainer, spread the Retainer enough to remove it from the groove in the hub of the Rotor.
15. Withdraw the Rear End Plate (16), Cylinder (20) and Vanes (19).

MAINTENANCE SECTION

16. While supporting the Front End Plate (21) between two blocks of wood on the table of an arbor press, press the Rotor from the Front Rotor Bearing (23). Check the Bearing for damage or roughness by slowly rotating it.
17. Do not remove the Rear Rotor Bearing (3) unless you have a new Bearing on hand for replacement. The old Bearing will be damaged during the removal process. To remove the Rear Rotor Bearing, thread a No. 10–24 x 2" long cap screw, having at least 1/2" of thread, through the Bearing Nut (2) located behind the Bearing. Keep tightening the screw to jack the Bearing from the Housing.
18. Unscrew the Air Inlet Bushing (8). Remove the Inlet Bushing Spacer (13A) and withdraw the Muffler Assembly (12), Throttle Valve Spring (11) and Throttle Valve (10).
19. Withdraw the Trigger Assembly (6).

NOTICE

Only remove the Throttle Valve Seat (5) when replacing it or when the Trigger Bushing (4) must be replaced.

20. 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.
21. Before removing the Trigger Bushing, all Seals and components must be removed from the Motor Housing.
 - a. Grasp the Motor Housing in leather-covered or copper-covered vise jaws with the Trigger Bushing upward.

NOTICE

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

- b. Using a torch, apply heat to the Motor Housing around the Bushing.
- c. Thread a No. 10–32 tap into the Bushing and pull the Bushing out of the Housing with the tap.

ASSEMBLY

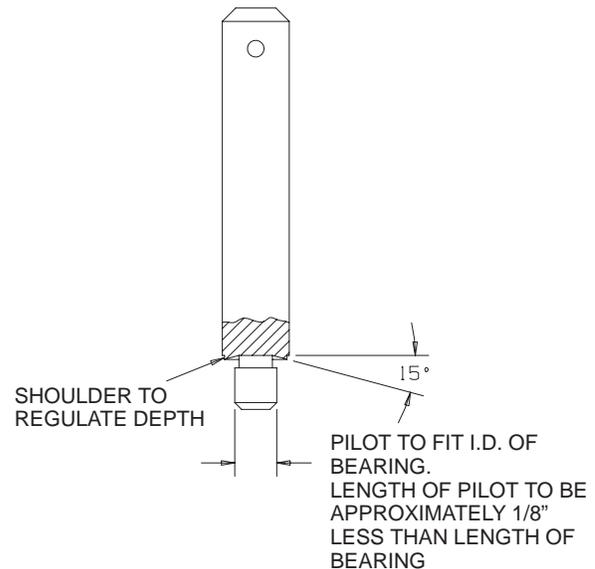
General Instructions

1. Always press on the **inner** ring of a ball-type bearing when installing the bearing on a shaft.
2. Always press on the **outer** ring of a ball-type bearing when pressing the bearing into a bearing recess.

* Registered trademark of Loctite Corporation.

3. 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.
4. Always clean every part and wipe every part with a thin film of oil before installation.
5. 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 bearing should never be cleaned.** Work grease thoroughly into every open bearing before installation.
6. Apply a film of O-ring lubricant to all O-rings before final assembly.
7. Unless otherwise noted, press on the stamped end of a needle bearing when installing the needle bearing in a recess. Use a bearing inserting tool similar to the one shown in Dwg. TPD786.

Needle Bearing Inserting Tool



(Dwg. TPD786)

Assembly of the Tool

1. If the Trigger Bushing (4) was removed, proceed as follows:
 - a. Put a few drops of Loctite®* No. 601 Sealant on the end of a thin stick and insert the stick into the trigger bushing hole of the Motor Housing. Work the stick so that the Sealant flows against the shoulder inside the Housing.
 - b. Insert the Trigger Bushing into the Motor Housing (1) to a depth of approximately one-half the length of the Bushing.

MAINTENANCE SECTION

- c. Put a few drops of Loctite No. 601 Sealant in the counterbore surrounding the outside diameter of the Bushing.
 - d. Rotate the Bushing approximately 180° to make certain the Sealant makes complete contact around the outside of the Bushing.
 - e. Push the Bushing into the Housing until it bottoms against the shoulder inside the Housing.
 - f. Allow the Sealant to cure for eight hours at room temperature.
2. Carefully grasp the Motor Housing in leather-covered or copper-covered vise jaws, inlet end facing upward.
 3. If the Throttle Valve Seat was removed, use a flat-faced rod 1/2" (12.7 mm) x 3" (76 mm) to push the Seat into the Motor Housing until it seats.
 4. Press the Trigger (6) onto the grooved end of the Trigger Pin (7) so that it is at right angles to the hole in the opposite end of the Pin.
 5. Insert a Trigger Assembly into the Trigger Bushing so that the hole in the Trigger Pin aligns dead center with the hole in the Throttle Valve Seat.
 6. While looking down through the bore of the Throttle Valve Seat, insert the Trigger Assembly (6) until the hole in the Trigger Stem is centered beneath the hole in the Throttle Valve Seat.
 7. Insert the Throttle Valve (10) so that the long-stem end passes through the hole in the Trigger Stem.
 8. Place the Air Strainer Screen (9), closed end first, inside the large end coil of the Throttle Valve Spring (11).
 9. Insert the Throttle Valve Spring and Screen, small coil first, so that the Spring encircles the end of the Throttle Valve.
 10. Place the Muffler Assembly (12) on the face of the handle so that the perforated baffle extends into the handle. Place the Inlet Bushing Spacer (13) between the Muffler Assembly (12) and Air Inlet Bushing (8) and tighten the Air Inlet Bushing to a minimum of 25 ft-lb (33.9 Nm) torque.
 11. Remove the Motor Housing from the vise.
 12. If the Rear Rotor Bearing (3) was removed, install a new one as follows:
 - a. Place the Bearing Nut (2) in the bore at the bottom of the bearing recess in the Motor Housing (1).
 - b. Using a bearing inserting tool that has a pilot extending into the Bearing, and a shoulder that contacts the outer race of the bearing, press the Rear Rotor Bearing, unstamped end first, into the bearing recess until it is about 0.010" (0.25 mm) below flush.
 - c. Inject a little of the recommended grease in the Bearing.
 13. Slide the Front End Plate (21), flat side first, over the splined end of the Rotor (18).
 14. Using a sleeve that contacts only the inner race of the Front Rotor Bearing (23), press the Front Rotor Bearing onto the splined hub of the Rotor until it seats against the Front End Plate.
 15. The clearance between the Front End Plate and the Rotor is critical. While holding the Front End Plate, gently tap the splined end of the Rotor until you can insert a 0.001" feeler gauge or shim between the face of the Rotor and End Plate.
 16. Grasp the splined end of the Rotor in leather-covered or copper-covered vise jaws so that the short hub of the Rotor is upward.
 17. Wipe each Vane (19) with a film of the recommended oil and place a Vane in each vane slot in the Rotor.
 18. Place the Cylinder (20), air port end trailing, down over the Rotor and against the Front End Plate.
 19. Place the Rear End Plate (16), flat side first, over the short hub of the Rotor.
 20. Install the Rear End Plate Retainer (17) in the groove on the rotor hub.
- NOTICE**
- Make certain the Rear End Plate Retainer (17) does not spring away as you slip it on the hub of the Rotor.**
21. Smear a film of the recommended grease on the Rear End Plate Gasket (15) and place the Gasket on the End Plate so that the port in the Gasket is aligned with the port in the End Plate.
 22. Using an assembly dowel 3/32" x 10" (2.3 mm x 254 mm), align the dowel groove in the Front End Plate Cylinder, Rear End Plate and Gasket. Place the assembly rod in the aligned grooves so that about 3" of the rod extends beyond the Rear End Plate. Insert the extension in the dowel hole at the bottom of the housing bore, and slide the motor into the Motor Housing until it seats.
 23. Withdraw the assembly dowel and insert the Cylinder Dowel (22).
 24. Place the two Bearing Spring Washers (26) inside the Front Rotor Bearing Housing (24).
 25. Slide the Front Rotor Bearing Housing over the Front Rotor Bearing.
 26. Using a sleeve that contacts only the outer race of the Bearing, press the Spindle Bearing (40) into the Gear Case (38) until it seats.

MAINTENANCE SECTION

27. Place the Grease Shield (42) against the Spindle Bearing so that the outer rim of the Grease Shield slides over the outer ring of the Bearing.
28. Install the Spindle Bearing Retainer (41) in the groove behind the Bearing and Grease Shield.
29. If the Spindle Planet Gear Bearings (30) were removed, press in new Spindle Planet Gear Bearings using a bearing inserting tool that has a pilot and that contacts the outer radius of the Bearing. See Dwg. TPD786. Press against the stamped end of the Bearing.
30. Work a small amount of the recommended grease into the gear teeth in the Gear Case.
31. Insert the Spindle (28), threaded end first, into the Gear Case and through the bore of the Spindle Bearing.
32. **For D ratio**, place the Drive Plate (33) over the shafts on the Spindle and insert the Bearing Housing Spacer (27).
For all other ratios, place a Spindle Planet Gear (29) on each gear shaft on the Spindle.
33. **For H, J, JJ, K or L ratio**, insert the Bearing Housing Spacer (27) into the Gear Case.
34. **For H, J or JJ ratio**, place the Rotor Pinion Spacer (32) followed by the Rotor Pinion (31) over the splined end of the Rotor.
35. **For D, H, J, JJ, K or L ratio**, thread the assembled Gear Case onto the Motor Housing and tighten it to 40 to 50 ft-lb (54.2 to 67.8 Nm) torque.
36. **For M, N or Q ratio**, place the Gear Head Spacer (37) in the Gear Case against the Spindle.
37. **For M, N or Q ratio**, insert the Gear Head (34) in the Gear Case, meshing the gear teeth on the Gear Head with the Spindle Planet Gears.
38. **For M, N or Q ratio**, place a Gear Head Planet Gear (35) on each of the planet gear shafts on the Gear Head, and insert the Bearing Housing Spacer (27) into the Gear Case.
39. **For M or N ratio**, place the Rotor Pinion Spacer (32), followed by the Rotor Pinion (31) over the splined end of the Rotor.
40. **For M, N or Q ratio**, thread the assembled Gear Case onto the Motor Housing and tighten it to 40 to 50 ft-lb (54.2 to 67.8 Nm) torque.

MAINTENANCE SECTION

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	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 complete 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.
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 valve 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 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 parts.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.