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MULTI-VANE® MOTORS

1800 Series

Operations and Maintenance Information



Save These Instructions

IR Ingersoll Rand®

 WARNING

General Product Safety Information

- Read and understand this manual before operating this motor.
- It is your responsibility to make this safety information available to others that will operate this motor.
- Failure to observe the following warnings could result in injury.

 WARNING

- Always operate, inspect and maintain this motor 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 motor at 90 psig (6.2 bar/620 kPa) air pressure at the inlet with 1/2" (13 mm) air supply hose.
- Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this motor.
- Do not use damaged, frayed or deteriorated air hoses and fittings.
- Keep hands, loose clothing and long hair away from rotating end of motor.
- Anticipate and be alert for sudden changes in motion during start up and operation of any motor.
- Motor shaft may continue to rotate briefly after the throttle is released.
- Do not lubricate motor 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.
- This motor is not designed for working in explosive atmospheres.
- This motor is not insulated against electric shock.

Safety Symbol Identification



(Dwg. MHP2454)



(Dwg. MHP2455)



(Dwg. MHP0884)

Safety Information - Explanation of Safety Signal Words



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



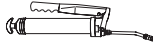
CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

NOTICE

Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

Lubrication



Ingersoll-Rand No. 50 Ingersoll-Rand No. 100

We recommend the use of an air line lubricator in the air supply line. Attach the unit as close to the motor as practical. We recommend using an **Ingersoll-Rand** No. C11-03-G00 Filter-Regulator-Lubricator Unit. Keep the Lubricator filled with **Ingersoll-Rand** No. 50 Oil. These units have 3/8" pipe tap inlet and outlet.

After each forty hours of operation, or as experience indicates, remove the Grease Plug (29) and inject 1.5cc of

the recommended grease in the opening. Do not grease excessively. Too much grease in the Gear Case (28) will cause heating. Grease leakage from the spindle end is also an indication that an excessive amount of grease has accumulated within the Gear Case.

Direction of Spindle Rotation.

Series 1801 Non-reversible Motors can be assembled so that the Spindle rotates either clockwise or counter-clockwise.

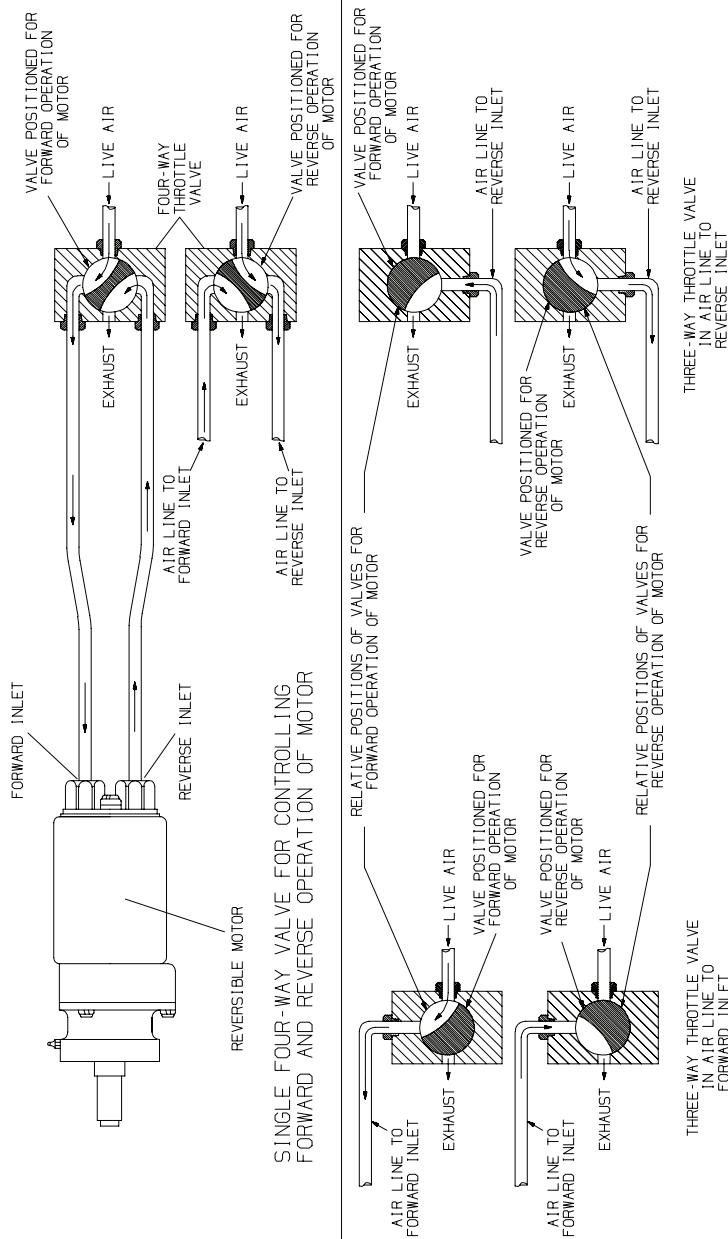
To reverse the direction of the spindle rotation:

1. Remove the motor assembly from the Motor Housing (14).
2. Remove one End Plate and Bearing assembly from the motor.
3. Lift the Cylinder (15) from the Rotor (12), turn it end for end, and slide it back over the Rotor.
4. Install the End Plate and Bearing assembly on the rotor hub and install the assembled motor in the housing.
5. Remove the two Backhead Cap Screws (4) and rotate the Backhead (2) and Backhead Gasket (6) 90° so that the cavity in the face of the Backhead is in alignment with the alternate set of holes in the back face of the Motor Housing. When the Backhead is correctly applied, the cavity will be over the letter "F" for **counterclockwise** spindle rotation (when facing the end of the Spindle), and over the letter "R" for **clockwise** rotation.

The rotation direction of an assembled Nonreversible Series 1801 Motor can be determined by removing the Air Strainer (1) and looking through the tapped opening to see whether the letter "F" or letter "R" is visible.

Apply the Backhead on Series 1841 Reversible Motors so that each inlet port aligns with a group of three holes through the housing rear wall.

Operation of Motor

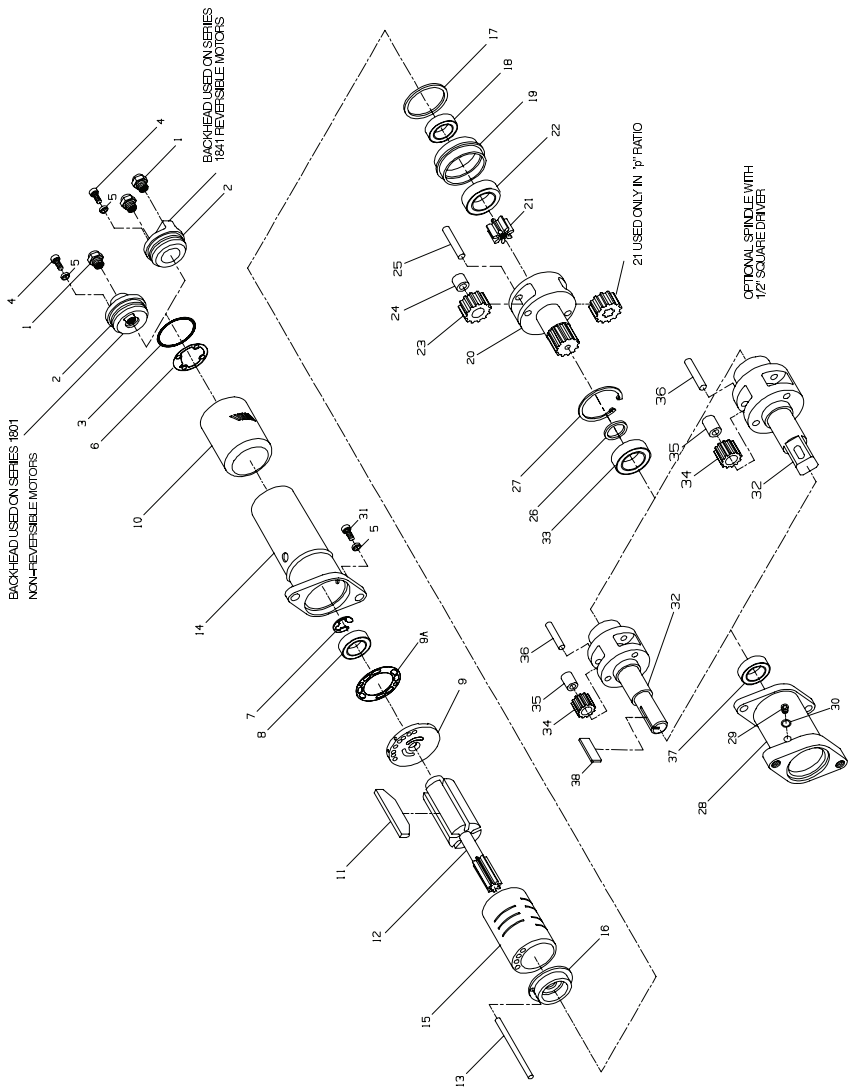


TWO THREE-WAY VALVES FOR CONTROLLING FORWARD AND REVERSE OPERATION OF MOTOR

(Dwg. TPB176)

Notes

1800 Series Exploded Diagram.



(Dwg. TPB183-1)

1800 Series Parts List

Sl. No.	Description	Part Number	Sl. No.	Description	Part Number
1	Air Strainer (1 for Series 1801: 2 for Series 1841)	R18-465A	21	Rotor Pinion (for Model 1801P or 1841P)	R1801P-17
2	Backhead		20	Gear Head	
	for Series 1801	R1801-102		for Model 1801P or 1841P	R1801P-216
	for Series 1841	R1841-102		for Model 1801Q or 1841Q	R1801Q-216
• 3	Exhaust Deflector Seal	R10V-310		for Model 1801U or 1841U	R1801U-216
4	Backhead Cap Screw (2)	510-638		for Model 1801W or 1841W	R1801W-216
5	Lock Washer (4)	8U-58	22	Gear Head Bearing	4E-510
• 6	Backhead Gasket		23	Gear Head Planet Gear (2)	
	for Series 1801	R1801-283		for Model 1801P or 1841P (14 teeth)	R1801P-10
	for Series 1841	R1841-283		for Model 1801Q or 1841Q (19 teeth)	R1801Q-10
• 7	Rotor Bearing Retainer	404-118		For Model 1801U, 1841U, 1801W or 1841W (21 teeth)	R1801U-10
• 8	Rear Rotor Bearing	R1-24			
• 9	Rear End Plate	R1801-12A			
• 9A	Rear End Plate Gasket	R1802-740	24	Gear Head Planet Gear Bearing (2) for Model 1801Q, 1801U, 1801W, 1841Q, 1841U or 1841W	R1AL-654
† 10	Exhaust Deflector				
	Standard	R1801-23			
	with 3/4" pipe tap Exhaust Port (for piped-away exhaust)	R1801-A123			
†	Deflector Front Seal (used with No. R1801-A123 Deflector)	R10V-310	25	Gear Head Planet Gear Shaft (2)	R1A-191
• 11	Vane Packet (set of 5 Vanes)	R1801-42-5	26	Gear Head Spacer (all except N ratio)	R1AP-80
12	Rotor		27	Spindle Bearing Retainer (all except N ratio)	R1AP-118
	for Model 1801N, 1801P, 1801U, 1801W, 1841N, 1841P 1841U or 1841W	R1801P-53	28	Gear Case	
	for Model 1801Q or 1841Q	R1801Q-53		for Model 1801N or 1841N	R1841N61-37
				for all other models	R1801P-37
13	Cylinder Dowel	R18-98	29	Grease Plug	R00A-95
† 14	Motor Housing	R1801-40	30	Grease Plug Washer	R3-92A
• 15	Cylinder		31	Gear Case Cap Screw (2)	G57T-634
	for Series 1801	R1801-3		Spindle Assembly	
	for Series 1841	R1841-3		for Model 1801N or 1841N (5/8" round shaft)	R1801N-A108
• 16	Front End Plate	R1801-11		for Model 1801P, 1801Q, 1801U, 1841P, 1841Q or 1841U	
• 17	End Plate Gasket	R1801-739		with 5/8" round shaft	R1801P-A108
• 18	Front Rotor Bearing	R1-24A		with 1/2" square drive	R1801P-8
19	Bearing Cage	R1801-113		for Model 1801W or 1841W with 5/8" round shaft	R1801W-A108
	Gear Head Assembly			with 5/8" square shaft	R1801W-A8
	for Model 1801P or 1841P	R1801P-A216			
	for Model 1801Q or 1841Q	R1801Q-A216			
	for Model 1801U or 1841U	R1801U-A216			
	for Model 1801W or 1841W	R1801W-A216			

† Not illustrated.

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

† **IMPORTANT:** The complete size symbol stamped on these parts must be stated when ordering a replacement Motor Housing or Exhausted Deflector.

1800 Series Parts List (continued)

32	Spindle		34	Spindle Planet Gear (3)	
	for Model 1801N or 1841N (5/8" round shaft)	R1801N-108		for Model 1801N or 1841N (21 teeth)	R1801U-10
	for Model 1801P, 1801Q, 1801U, 1841P, 1841Q or 1841U			for Model 1801P, 1801Q, 1801U, 1841P, 1841Q or 1841U (17 teeth)	R1801P-10
	with 5/8" round shaft	R1801P-108		for Model 1801W or 1841W (19 teeth)	R1801W-9
	with 1/2" square shaft	R1801P-8	35	Spindle Planet Gear Bearing Gear (1 for each Gear)	R1A1-654
	for Model 1801W or 1841W			36 Spindle Planet Gear Shaft (3)	F02-15
33	with 5/8" round shaft	R1801W-108	37	Spindle Front Bearing	4UA9-593
	with 5/8" square drive	R1801W-8		38 Spindle Key	555-410
	Spindle Rear Bearing				
	for Model 1801N or 1841N	4E-510			
	for all other models	R1AP-97			

Maintenance Section



WARNING

Always use protective eyewear when performing maintenance on a motor or operating a motor.

Always turn off the air supply and disconnect the air supply line before installing, removing or adjusting any accessory on this motor, or before performing maintenance on this motor. Failure to do so could result in injury.

Disassembly

General Instructions

- Do not disassemble the motor any further than necessary to replace or repair damaged parts.
- Do not press any needle bearing from a part unless you have a new needle bearing on hand for installation. Needle bearings are always damaged during the removal process.
- When grasping a tool in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part or motor and help prevent distortion. This is particularly true of threaded members and housing.
- 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.
- When removing the Planet Gear Shafts (25 or 36), support the motor end of the assembly and press the Shafts out toward the motor end. The shaft holes through the web are slightly tapered so that the Shafts have a tighter fit in the front web.

Disassembly of the Motor

- Unscrew and remove the Inlet Bushings (1) from the Backhead (2).
- Thread a piece of pipe about 6" long having an external 3/8" pipe thread into one of the inlet bushing holes. Use the pipe to clamp the motor into a vise for disassembly and assembly procedures.

- Using a 3/16" hex wrench, unscrew and remove the two Gear Case Cap Screws (31) and Lock Washers (5).
- Separate the Gear Case (28) from the Motor Housing (14) and set the assembled Gear Case aside.
- Grasp the pinion of the Rotor (12) and pull the assembled motor out of the Motor Housing (14). It may be necessary to gently tap the face of the Motor Housing with a plastic hammer to jar the assembly free.
- Grasp the Cylinder (15) in one hand and using a plastic hammer, sharply rap the spline end of the Rotor to remove the Front End Plate (16) and Front Rotor Bearing (18) which will free the Cylinder and Vanes (11). Remove the Cylinder Dowel (13).
- Jar the Front Bearing out of the Front End Plate by bumping the End Plate on a wooden block.
- Use a thin blade screwdriver to pry the Rotor Bearing Retainer (7) off the hub of the Rotor and remove the Rear Rotor Bearing (8), Rear End Plate Gasket (9A) and Rear End Plate (9).
- Using a 3/16" hex wrench, unscrew and remove the two Backhead Cap Screws (4) and Lock Washers (5).
- Remove the Backhead, Exhaust Deflector Seal (3) and Backhead Gasket (6) from the rear of the Motor Housing.
- Slide the Exhaust Deflector (10) off the Motor Housing.

Disassembly of the Gearing

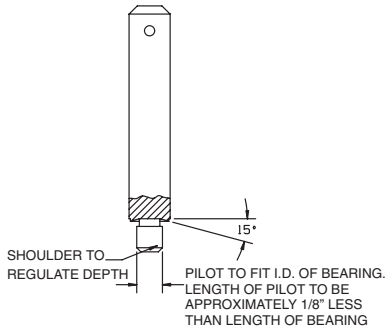
- For all Models except 1801N or 1841N**, grasp the Gear Head Gearing (22) and pull the assembled Gear Head (20) out of the Gear Case (28). Remove the Gear Head Spacer (26) from the spline shaft of the Gear Head.
- For all Models except 1801N or 1841N**, using a bearing puller, pull the Gear Head Bearing off the rear hub of the Gear Head.
- For all Models except 1801N or 1841N**, support the short hub end of the Gear Head on the table of an arbor press and press the Gear Head Planet Gear Shafts (25) from the Gear Head. Make certain the Shafts are pressed out toward the short hub because the holes in the Gear Head are tapered smaller toward the front of the Gear Head.
- For all Models except 1801N or 1841N**, remove the Gear Head Planet Gears (23) from the Gear Head.
- For Models 1801P or 1841P**, remove the Rotor Pinion (21)

6. **For all Models except 1801N or 1841N**, if the Gear Head Planet Gear Bearing or Bushings (24) must be replaced, press them from the Planet Gears.
7. **For all Models except 1801N or 1841N**, using internal snap ring pliers, remove the Spindle Bearing Retainer (27) from the inside of the Gear Case.
8. Holding the Gear Case, push the output end of the Spindle (32) to move the Spindle Assembly out the motor end of the Gear Case.
9. Using a bearing puller, pull the Spindle Rear Bearing (33) off the rear hub of the Spindle.
10. Using a bearing puller, pull the Spindle Front Bearing (37) off the front hub of the Spindle.
11. Support the short hub end of the Spindle on the table of an arbor press and press the Spindle Planet Gear Shaft (36) from the Spindle. Make certain the Shafts are pressed out toward the short hub because the holes in the gear frame of the Spindle are tapered smaller towards the output end of the spindle shaft.
12. Remove the Spindle Planet Gears (34) from the Spindle.
13. If the Spindle Planet Gear Bearings (35) must be replaced, press them from the Planet Gears.

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.
3. Whenever grasping a tool or part in a vise, always use leather-covered or copper-covered vise jaws. Take extra care not to damage threads or distort housings.
4. Except for bearings, 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 using suitable solution and dry with a clean cloth. Sealed or shielded bearings should not be cleaned. Work grease into every bearing before installation.
6. Apply a film of O-ring lubricant to every O-ring before installation.
7. When installing the Planet Gear Shafts (25 or 36), support the spindle end of the assembly and press the Shafts in toward the spindle end. The shaft holes through the web are slightly tapered so that the Shafts have a tighter fit in the front web.
8. 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. TPD786.



(Dwg. TPD786)

Assembly of the Gearing

1. If the Spindle Planet Gear Bearings (35) were removed from the Spindle Planet Gears (34), press new Bearings into the Gears using a needle bearing inserting tool. If any Gears are damaged, install a complete new set of Gears. Do not mix old Gears with new Gears in the same motor.
2. Support the web at the output end of the Spindle (32) on the table of an arbor press and position a Spindle Planet Gear with a Bearing in the web. The holes in the webs of the Spindle are tapered and smaller toward the output end of the Spindle. Press a Spindle Planet Gear Shaft (36) through the rear web and Bearing into the front web until the Shaft is flush with the face of the rear web.
3. Repeat Step 2 with the remaining Spindle Planet Gears and Bearings.
4. Stand the Spindle, output end upward, on the table of an arbor press and using a piece of tubing that will clear the Spindle, press the Spindle Front Bearing (37) onto the Spindle.
5. Invert the Spindle and without applying pressure to the Spindle Front Bearing, press the Spindle Rear Bearing (33) onto the short hub of the Spindle.
6. Apply lubricant to the gearing and shaft and insert the assembled Spindle, output end leading, into the end of the Gear Case (28) with the largest opening. Push the assembly into the Gear Case until the Spindle Front Bearing seats in the gear case bearing recess.
7. **For all Models except 1801N or 1841N**, use snap ring pliers to install the Spindle Bearing Retainer (27) in the groove inside the Gear Case.
8. **For all Models except 1801N, 1801P, 1841N or 1841P**, if the Gear Head Planet Gear Bearings (24) were removed from the Gear Head Planet Gears (23), press new Bearings into the Gears using a needle bearing inserting tool. If any Gears are damaged, install a complete new set of Gears. Do not mix old Gears with new Gears in the same motor.
For Models 1801P or 1841P, if the Gear Head Planet Gear Bushings (24) were removed from the Gear Head Planet Gears (23), press new Bushings into the Gears. If any Gears are damaged, install a complete new set of Gears. Do not mix old Gears with new Gears in the same motor.
9. **For all Models except 1801N, 1801P, 1841N or 1841P**, support the web at the spline shaft end of the Gear Head (20) on the table of an arbor press and position a Gear Head Planet Gear with a Bearing in the web. The holes in the webs of the Gear Head are tapered and smaller toward the spline shaft end of the Gear Head. Press a Gear Head Planet Gear Shaft (25) through the rear web and Bearing into the front web until the Shaft is flush with the face of the rear web.
For Models 1801P or 1841P, support the web at the spline shaft end of the Gear Head (20) on the table of an arbor press and position a Gear Head Planet Gear with a Bushing in the web. The holes in the webs of the Gear Head are tapered and smaller toward the spline shaft end of the Gear Head. Press a Gear Head Planet Gear Shaft (25) through the rear web and Bushing into the front web until the Shaft is flush with the face of the rear web.
10. **For Models 1801P or 1841P**, insert the Rotor Pinion (21) into the center of the Gear Head. This must be done before installing the second Gear in the Gear Head. It cannot be installed after a second Gear is secured in position.
11. **For all Models Except 1801N or 1841N**, repeat step 9 with the remaining Gear Head Planet Gear and Bearing or Bushing.

12. **For all Models except 1801N or 1841N**, stand and support the assembled Gear Head on the table of an arbor press with the spline shaft end downward and press the Gear Head Bearing (22) onto the hub of the Gear Head.
13. **For all Models except 1801N, 1801P, 1841N or 1841P**, slide the Gear Head Spacer (26) onto the spline shaft of the Gear Head.
14. **For all Models except 1801N or 1841N**, apply lubricant to the gear head gearing and while engaging the spline of the Gear Head with the gearing of the Spindle, slide the assembled Gear Head into the Gear Case.

Assembly of the Motor

1. Position the Backhead Gasket (6) against the rear face of the Motor Housing (14).
For Series 1801 Non-reversible Motors, position the Gasket to block of the holes in the quadrant marked with an "R" if forward rotation is desired, or to block off the holes in the quadrant with an "F" if reverse rotation is desired.
For Series 1841 Reversible Motors, position the Gasket so that the gasket material dividing the central opening separates the forward quadrant marked with an "F" from the reverse quadrant marked with an "R."
2. Install the Exhaust Deflector Seal (3) in the annular groove that encircles the Backhead (2).
3. Slide the Exhaust Deflector (10) large opening end trailing, over the Motor Housing.
4. Place the Backhead against the Gasket making sure the Exhaust Deflector slips over the Exhaust Deflector Seal without nicking or damaging the Seal. Install the two Backhead Cap Screws (4) and Lock Washers (5) to secure the Backhead and Exhaust Deflector to the Motor Housing.
5. Thread a 6" long piece of pipe with a 3/4" external pipe thread into the Backhead and grasp the pipe in vise jaws with the Motor Housing upward.
6. Insert the Rear End Plate Gasket (9A) into the motor bore opening of the Motor Housing and move it to the bottom of the opening. Make certain the dowel holes in the Gasket align with the Cylinder Dowel holes in the bottom of the motor bore.
7. Push the Rear End Plate (9), flat face leading, onto the short hub of the Rotor (12).

8. Push the Rear Rotor Bearing (8) onto the short hub of the Rotor against the Rear End Plate and install the Rear Rotor Bearing Retainer (7) in the groove on the shaft of the Rotor to retain the Bearing.
9. Place a Vane (11) in each vane slot in the Rotor and place the Cylinder (15) down over the Rotor and Vanes and against the Rear End Plate. Make certain the holes in the Cylinder and End Plate can be aligned. If they can't, invert the Cylinder.
10. Press the Front Rotor Bearing (18) into the Front End Plate (16).
11. Press the Front Rotor Bearing, Front End Plate leading, onto the spline end of the rotor shaft until the End Plate contacts the Cylinder.
12. Use a 1/8" rod approximately 9" long to align the cylinder dowel holes in the Front End Plate, Cylinder and Rear End Plate. Insert the end of the rod at the Rear End Plate end through the dowel hole in the Rear End Plate Gasket and into the dowel hole in the Motor Housing. Slide the assembled motor along the rod into the Motor housing until it bottoms against Gasket.
13. Remove the assembly rod and install the Cylinder Dowel (13) in its place.
14. Install the End Plate Gasket (17) over the hub of the Front End Plate.
15. Install the Bearing Cage (19), end nearest the largest outer hub trailing, over the rotor shaft and into the Motor Housing against the End Plate Gasket.
16. Install the assembled Gear Case against the Motor Housing. It may be necessary to rotate the Spindle by hand to properly engage the gearing with the spline on the Rotor.
17. Secure the Gear Case to the motor Housing with the two Gear Case Cap Screws (31) and Lock Washers (5).
18. Remove the assembled motor from the vise jaws and unscrew and remove the assembly pipe from the Backhead. Install the Air Strainer (1) (two for reversible models) in the Backhead.

NOTICE

SAVE THESE INSTRUCTIONS.

DO NOT DESTROY

Notes

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