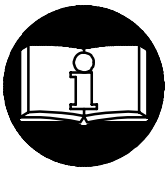
03541901
Form P7263
Edition 2
January, 1997

INSTRUCTIONS FOR MODELS P35A1 AND P35A3 SUMP PUMPS

NOTICE

Models P35A1 and P35A3 Sump Pumps are a "High Head" pump that is very popular in mining applications.

Ingersoll–Rand is not responsible for customer modification of pumps for applications on which Ingersoll–Rand was not consulted.



⚠ WARNING

**IMPORTANT SAFETY INFORMATION ENCLOSED.
READ THIS MANUAL BEFORE OPERATING PUMP.
IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION IN THIS MANUAL INTO THE HANDS OF THE OPERATOR.
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.**

PLACING PUMPS IN SERVICE

- Always operate, inspect and maintain this pump 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 pump at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet with 1" (25 mm) inside diameter air supply hose.
- Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this pump, or before performing any maintenance on this pump.
- Do not use damaged, frayed or deteriorated air hoses and fittings.
- Be sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905–1 for a typical piping arrangement.
- Always use clean, dry air at 90 psig maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air pump.
- Do not lubricate pumps with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.
- This pump is not designed for working in explosive atmospheres.
- This pump is not insulated against electric shock.

USING THE PUMP

- Always wear eye protection when operating or performing maintenance on this pump.
- Always wear hearing protection when operating this pump.
- Use accessories recommended by Ingersoll–Rand.
- Do not start or operate this pump unless it is submerged.

NOTICE

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

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

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

Printed in U.S.A.

**INGERSOLL-RAND®
PROFESSIONAL TOOLS**

WARNING LABEL IDENTIFICATION

⚠ WARNING

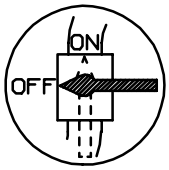
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠ WARNING

Always wear hearing protection when operating this pump.

⚠ WARNING

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



⚠ WARNING

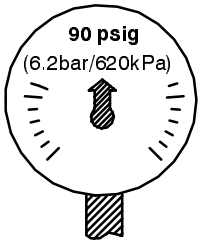
Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this pump, or before performing any maintenance on this pump.

⚠ WARNING

Do not use damaged, frayed or deteriorated air hoses and fittings.

⚠ WARNING

Keep body stance balanced and firm. Do not overreach when operating this pump.



⚠ WARNING

Operate at 90 psig (6.2 bar/620 kPa) Maximum air pressure.

PLACING PUMP IN SERVICE

LUBRICATION

Ingersoll-Rand No. 50 **Ingersoll-Rand No. 80 Water Pump Grease**

Always use an air line lubricator with this pump.
We recommend the following Filter–Lubricator–Regulator Unit:

For USA – No. 16LUB16
For International – No. 16LUB16

Before starting the pump, place 15 – 20 drops of Ingersoll–Rand No. 50 Oil into the air inlet before attaching the air hose. Unscrew the caps from the Grease Fittings (2 and 26) and inject 1 – 2 cc of Ingersoll–Rand No. 80 Grease. Be certain to replace the caps after greasing the pump.

After each forty-eight hours of operation, or as experience indicates, inject 1 – 2 cc of the Ingersoll–Rand No. 80 Grease into the Grease Fittings (2 and 26).

Never use ordinary cup grease as it emulsifies with water and will not lubricate in this condition. Automotive water pump grease is not satisfactory as it is made for use with hot water.

AIR STRAINER

Periodically, clean the Air Strainer Screen (32) as follows:

1. Shut off the air supply to the pump.
2. Unscrew the Air Strainer Cap (31) and remove the Air Strainer Screen.
3. Clean the Screen in a suitable cleaning solution.

IMPELLER ADJUSTMENT

For the most efficient operation of the pump, particularly against high heads, it is necessary that proper Impeller clearance be maintained.

1. Pumps are assembled at the factory with a sufficient quantity of Suction Seal Shims (37) to provide 0.010" clearance between the faces of the Impeller (11) and the Suction Seal (43). When, due to wear, this clearance has increased to 0.032" (1/32"), remove enough Shims to obtain the original 0.010" clearance.
2. If decreased efficiency is noted, remove the Impeller and slip some of the Impeller Shims (12) from the Rotor (16). Replace the Impeller and tighten the Impeller Nut (10). Rotate the Impeller. Repeat this procedure until enough Impeller Shims have been removed to cause a slight drag, then add one 0.010" Shim. Adjust the clearance between the Impeller and the Suction Seal (as explained in the preceding paragraph) whenever Impeller Shims have been removed.

OPERATION

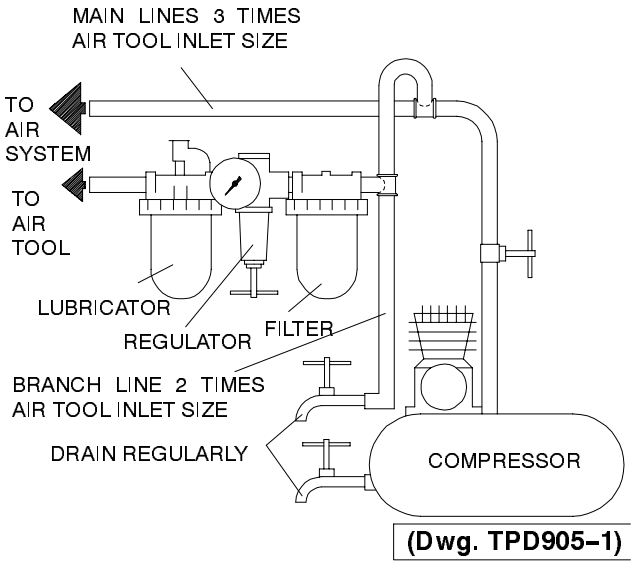
Always use an Exhaust Hose and be certain the free end of the Hose is kept well above the surface of the liquid.
Do not allow the pump to operate at free speed (not submerged) for long periods of time. The frictional heat generated will damage the composition sealing members.
Prevent dirt from entering the pump. When pumping from a ditch or natural sump, set the pump on a board or flat stone or suspend it a few inches from the bottom of the sump. Arranging a wire screen around the inlet or setting the pump in a wire basket is also recommended.
If the inlet becomes clogged, stop the motor and lift the pump from the liquid. Liquid flowing through the discharge line will usually flush the obstruction from the inlet.
If the pump is stopped while pumping dirty liquids, gravel washed back through the pump by the liquid in the discharge line may sprag the impeller and prevent the motor from starting when the air is turned on. If the gravel cannot be dislodged by jarring or striking the pump with a wooden block; make sure that the air is turned off, remove the air line from the pump, remove the Inlet and rotate the Impeller by hand.
Be certain the Governor Valve slides freely in the Governor Valve Bushing. A sticking Governor Valve is the most common cause of erratic motor speed. A loose, sloppy fit resulting from a badly worn Valve or Bushing produces the same effect.

PLACING TOOL IN SERVICE

INSTALLATION

Air Supply and Connections

Always use clean dry air at 90 psig maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air tool. An air line filter can greatly increase the life of an air tool. The filter removes dust and moisture. Be sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905–1 for a typical piping arrangement.

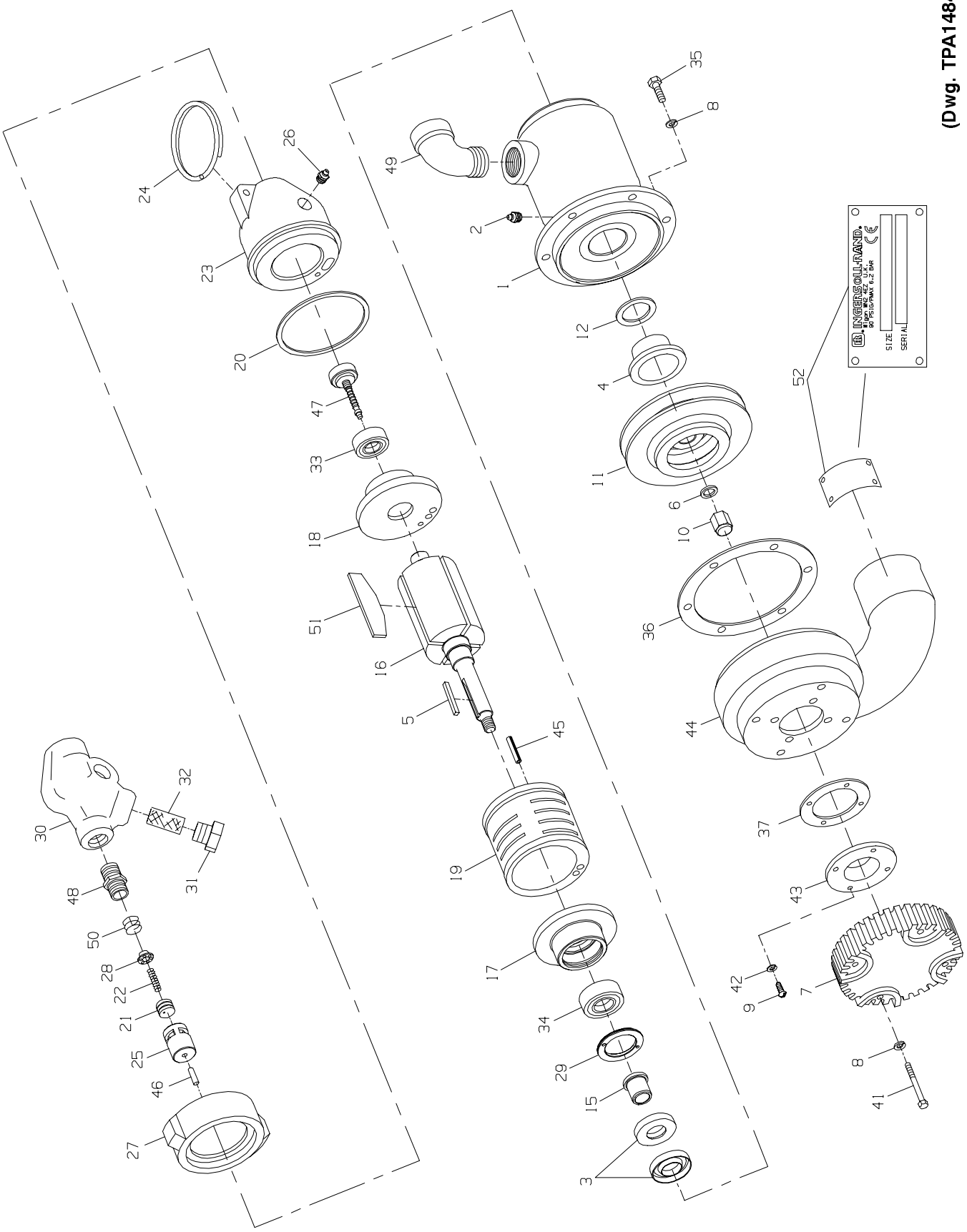


(Dwg. TPD905–1)

Model P35 Sump Pump is a "High Head" pump that is very popular in mining applications.

HOW TO ORDER A SUMP PUMP

Model	Size of Opening Pump will Pass Through in.	mm	Pump Housing Material
P35A1	19–1/2 x 14–1/2	495 x 268	Iron
P35A3	19–1/2 x 14–1/2	495 x 268	Iron


(Dwg. TPA1484)
INGERSOLL-RAND
SIZE
SERIAL

			PART NUMBER FOR ORDERING				PART NUMBER FOR ORDERING
	1	Motor Housing Assembly	S35-40		29	Bearing Retainer	S35-400
+	2	Grease Fitting (2)	P25-188	+	30	Air Strainer Assembly	S35-A267
+ •	3	Water Seal (2)	P35-153		31	Air Strainer Cap	S35-268
+	4	Impeller Hub Bushing	S35-41	+ •	32	Air Strainer Screen	205-1061
+	5	Impeller Key	P35-150	+ •	33	Rear Rotor Bearing	R5H-22
+	6	Impeller Washer	P35-157	•	34	Front Rotor Bearing	S35-21
+	7	Inlet	P25-1488	+	35	Brass Bolt (6)	P35-114
+	8	Spring Washer (10)	D02-321	+	36	Impeller Case Gasket	P35-113
+	9	Suction Seal Capscrew (4)	P35-146	+ •	37	Suction Seal Shim (as required)	
+	10	Impeller Nut	P25-142			0.003" (0.075mm)	P35-145-3
+ •	11	Impeller	S35-143			0.005" (0.125 mm)	P35-145-5
+ •	12	Impeller Shim				0.015" (0.375 mm)	P35-145-15
		0.005" (0.125 mm)	P35-151-5			0.031" (0.780 mm)	P35-145-31
		0.010" (0.250 mm)	P35-151-10	+	41	Brass Bolt (4)	P35-117
		0.025" (0.625 mm)	P35-151-25	+	42	Spring Washer (4)	L01-67
	15	Impeller Spacer	S35-152	+	43	Suction Seal	P35-144
	16	Rotor	S35-53	+	44	Impeller Case	
+ •	17	Front End Plate	S35-11			for P35A1 (2" NPT)	S35-112
+ •	18	Rear End Plate	S35-12			for P35A3 (2" BSP)	S35-212
+ •	19	Cylinder	R5H-3		45	Cylinder Dowel	S35-98
•	20	Housing Gasket	P35-43		46	Governor Valve Stem	S35-410
	21	Governor Valve	S35-425		47	Governor Assembly	S35-424
+	22	Governor Valve Spring	P35-431	+	48	Air Strainer Nipple	P35-286
+	23	Backhead Assembly	S35-102	+	49	Exhaust Elbow	P35-587
	24	Handle	S35-227	+	50	Seat Retaining Spring	H80-81B
	25	Governor Valve Bushing	S35-429	+	51	Vane Packet (set of 4 Vanes)	R5H-42-4
+	26	Grease Fitting	P25-188		52	Nameplate	
+	27	Housing Nut	P35-282			for P35A1 and P35A3	P25-99
+	28	Governor Valve Spring Seat	P25-418			for P35A1-EU and P35A3-EU	P25-EU-99

• 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.

+ These parts are interchangeable with the 35A3 Sump Pump.

MAINTENANCE SECTION

⚠ WARNING

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

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

LUBRICATION

Each time the Model P35 Sump Pump is disassembled for maintenance, repair or replacement of parts, lubricate the pump as follows:

Inject 1 – 2 cc of Ingersoll–Rand No. 80 Grease through the Grease Fittings (3 and 40).

DISASSEMBLY

General Instructions

1. Do not disassemble the pump 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 pump unless you have a complete set of new gaskets and O–rings for replacement.

Disassembly of the Sump Pump

1. If the Air Strainer Screen (32) is to be cleaned or replaced, unscrew the Air Strainer Cap (31) and withdrawn the Screen.
2. With the Motor Housing (1) clamped in leather–covered or copper–covered vise jaws horizontally, remove the four Brass Bolts (41) and Spring Washers (8).
3. Remove the Impeller Nut (10) and the Impeller (15).
4. Reposition the Motor Housing in the vise vertically. Unscrew the Housing Nut (27) and carefully remove the Backhead Assembly (23).
5. While grasping the Governor Assembly (47) in one hand, gently tap on the impeller end of the Rotor (16) with a plastic hammer and withdraw the assembled motor.
6. Carefully remove the Impeller Shim (12), the Water Seals (3), and the Impeller Spacer (15).
7. Remove the Front Rotor Bearing (34), Impeller Washer (6) the Rear Rotor Bearing (33).

Disassembly of the Motor

1. Carefully unscrew the Governor Assembly (47).
2. Remove the Rear End Plate (18).
3. Remove the four Vanes (51) then the Cylinder (19).
4. Remove the Front End Plate (21).
5. If required, remove the Rotor Bearings (33 and 34) from both End Plates.

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 with threaded parts and housings.
4. Except for bearings, 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 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.

Assembly of the Motor

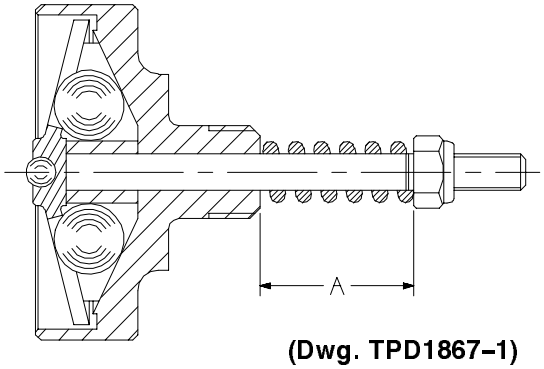
1. If required, reinstall the Rotor Bearings (33 and 34) in the Front and Rear End Plates (17 and 18).
2. Place the Front End Plate on the slotted end of the Rotor (16).
3. Slide the Cylinder (19) over the Rotor.
4. Apply a thin coat of recommended oil to the Vanes (51) and install them in the slots in the Rotor.
5. Place the Cylinder Dowel (45) in the hole in the Cylinder.

6. Place the Rear End Plate on the Rotor.
7. Carefully reinstall the Governor Assembly (47) into the Rotor.

GOVERNOR ADJUSTMENT

When installing a new Governor Assembly, screw the Adjusting Nut onto the governor stem until dimension "A" equals 1–15/16" at 5000 RPM. This will usually result in the proper governed free speed. However, **this is only an approximate setting** and further adjustment may be necessary. Screw the nut farther onto the stem to **increase** the speed; back it off to **decrease** the speed.
See Dwg. TPD1867.

"A" = 1–15/16" (49.2 mm) at 5000 RPM



(Dwg. TPD1867–1)

Assembly of the Sump Pump

1. Place the Impeller Spacer (15) on the Rotor.
2. Start one Seal, lip side last, into the bore of the Motor Housing and press in the Impeller Hub Bushing. The Bushing will force the Seal into the Housing to the roper depth.
3. Slip the other Seal, lip side last, onto a round smooth rod, the same (or slightly larger) diameter as the shank on the Impeller Spacer. Grease the spacer shank. Place the end of the rod against the spacer face, and slide the Seal from the rod onto the Spacer.
4. Carefully place the two Water Seals (3) on the Impeller Spacer with their lips opposing each other.
5. In required, replace the Impeller Hub Bushing (4).
6. Clamp the Motor Housing (1) in leather–covered or copper–covered vise jaws, Impeller end down.
7. Place the Backhead (23) onto the Motor Housing, making sure that the Cylinder Dowel seats in the dowel hole.
8. Secure the Backhead with the Housing Nut (27).
9. Rotate the Motor Housing in the vise.
10. Reinstall the Impeller Shim (12).
11. With the Impeller Key (5) in the Rotor, reinstall the Impeller (11) on the Rotor and secure it with the Impeller Nut (10).
18. Reinstall the Impeller Case (44) and secure it with the four Brass Bolts (41) and Spring Washers (8).

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Low power or low free speed	Dirty Air Strainer Screen and/or Muffler	Using a clean, suitable, cleaning solution in a well–ventilated area, clean the Air Strainer Screen and/or Muffler. Allow to air dry.
	Worn or broken Vanes	Replace **complete** set of Vanes.
	Worn or broken Cylinder	Examine Cylinder and replace it if it is worn or broken or if bore is scored or wavy.
	Improper lubrication or dirt build–up in the motor	Lubricate the pump as instructed in **LUBRICATION**. If lubrication does not result in satisfactory operation, disassemble the pump, inspect and clean all parts.
Erratic speed	Sticking Governor Valve	Replace Governor Valve and/or Governor Valve Bushing.
Rough operation	Worn or broken Rear Rotor Bearing or Front Rotor Bearing	Examine each Bearing. Replace if worn or damaged.
Scoring of End Plates and Cylinder	Improper assembly	Make certain that all motor parts are properly aligned prior to clamping the motor assembly.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.

NOTES

NOTES