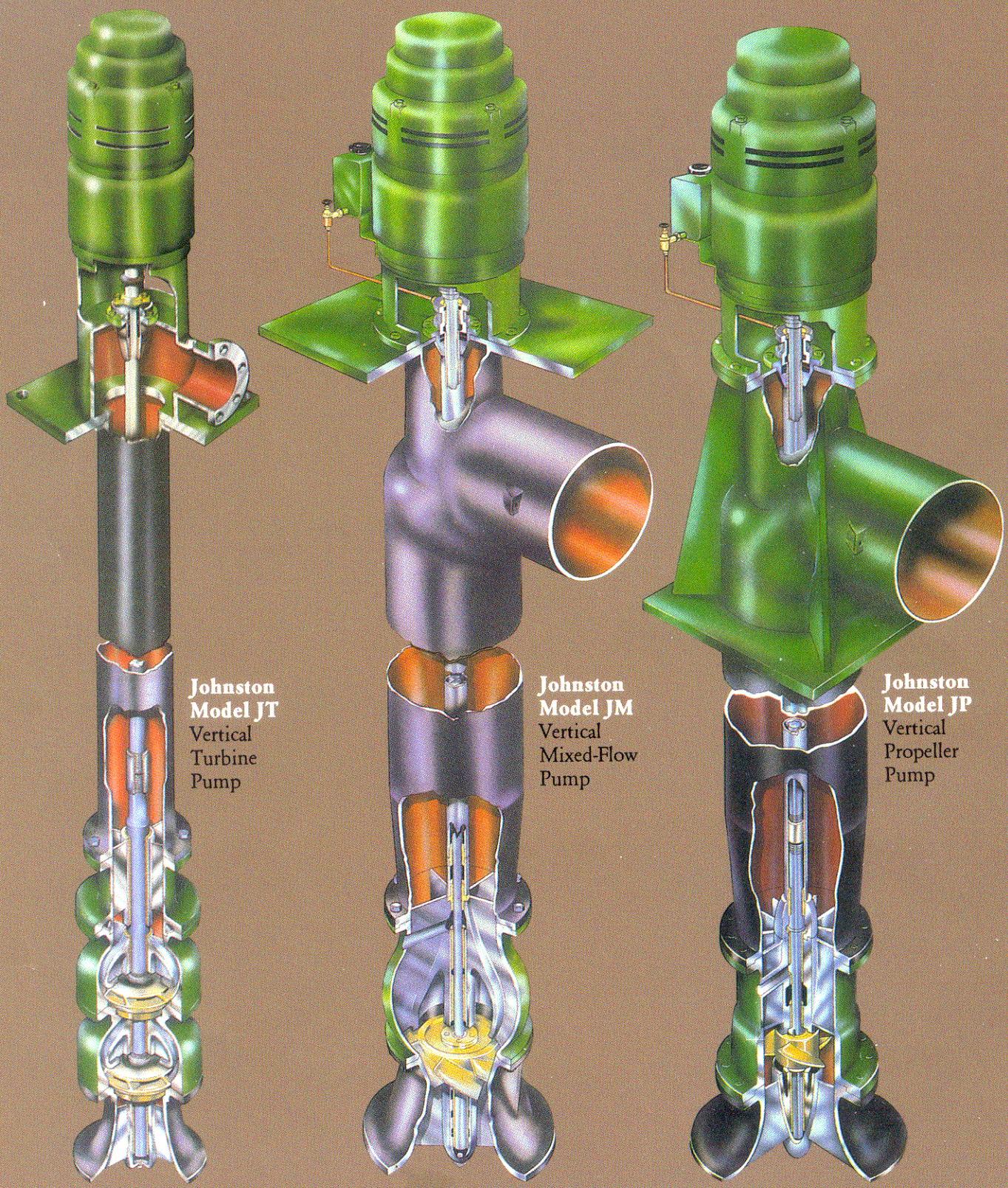

Johnston
Model JT
Vertical
Turbine
Pump

Johnston
Model JM
Vertical
Mixed-Flow
Pump

Johnston
Model JP
Vertical
Propeller
Pump

THE IMPORTANCE OF TROUBLESHOOTING

If your vertical pump has been properly built to meet your operating specifications and correctly installed, it should deliver years of satisfactory service with minimum maintenance. Of course, pump life will vary depending upon the application, the liquid being pumped, and the overall operating conditions.

No matter how dependable your pump proves to be, there comes a time in the life of any machine when trouble signs start to show up. Identifying and correcting the trouble before a serious breakdown occurs is vitally important. In most industrial, municipal, and agricultural applications, the pump is a critical element. A pump breakdown can bring the whole process to a halt and cause costly downtime. That's why it's so important to become familiar with proper pump performance, to monitor pump operation closely, and to correct problems as quickly as possible.

No two pumps behave exactly alike. Each develops its own characteristic patterns of sound and vibration. Once you establish what is "normal" for your pump, be alert to changes in these day-to-day patterns that could mean trouble. Increased or erratic vibration of the driver is often the first symptom of an impending breakdown. Other danger signs include reduced speed, decreased flow rate, excessive leakage, and strange noises.

Further symptoms may become evident if you pull and disassemble the pump. Watch for unevenly worn parts, bent shafts, loose impellers, and signs of corrosion or abrasion.

The purpose of this *Troubleshooting Guide* is threefold:

1. To help you understand how your vertical pump works.
2. To help you spot problems in pump operation and identify probable causes.
3. To suggest possible solutions to the problems.

Obviously we cannot cover *all* pump problems in a volume this size. However, the following pages are a good overview of the problems commonly encountered. We at Johnston Pump Company hope this guide will help you not only to keep your vertical pumps running properly, but also to return disabled pumps to service quickly.

CONTENTS

CHECKPOINTS FOR STARTING A VERTICAL PUMP

1. On vertical hollow-shaft motors, remove the top shaft nut (adjusting nut) and motor drive coupling (motor clutch). On vertical solid-shaft motors, disconnect the motor pump coupling. Verify that the direction of rotation is correct (see nameplate).
2. When rotation is correct, reconnect the pump and motor, and adjust the impellers (see instruction on adjustment).
3. Check the hold-down bolts on the motor, baseplate and discharge flange. Check lubrication systems (oil lube, grease lube and water lube). Adjust the seal or packing box gland; gland nuts should be finger-tight at startup.
4. Make sure the pump has sufficient fluid in the sump or supply lines. Make sure all suction valves are fully open on barrel-type pumps. *Do not run any pump without fluid.*
5. Start the pump and check amperage on the motor. Run the pump long enough to determine that no unusual noise or vibration is present and that the mechanical seal or packing box is functioning properly.

Vertical Pump Impeller Adjustment

Improper impeller adjustment can cause unnecessary wear, reduction of capacity and pressure, and motor overload problems. Impellers set too low will drag on the pump bowls and wear both the impeller skirts and bowl castings, eventually destroying them. Impellers set too high can drag on the upper bowl case. Both situations cause high horsepower loading that frequently kicks out the motor overload relays. If drag is severe, shafts can snap before overloads will trip.

Improper impeller settings can also create vibration and cause premature bearing wear and failure. The following instructions must be followed to avoid these problems.

Vertical pumps are provided with either a vertical hollow-shaft driver or a vertical solid-shaft driver. On the vertical hollow-shaft driver, the impeller adjusting nut is situated above the motor drive coupling. On the vertical solid-shaft driver, the adjusting nut is a component of the flanged motor-pump coupling.

Vertical Turbine Pump Adjustment

Initial Adjustment

Rotate the adjusting nut until the rotation assembly turns without dragging. Then continue to rotate the adjusting nut until the vertical clearances obtained are slightly higher than those listed in the table.

Use an ammeter to check the preliminary setting, and make sure that the impellers are not dragging and the motor is not overloaded.

Do not attempt to run the pump with the impellers dragging! Permanent damage will result!

Final Adjustment

After the system is operational, the impellers can be reset to recommended clearances.

Adjust closed impellers in accordance with the manufacturer's instructions or use the table below as a guide.

Semi-open and mixed flow impellers should be adjusted to operate at the minimum allowable clearance without dragging when in operation. An ammeter is necessary to obtain this fine adjustment and to determine that the motor is not overloaded. With semi-open impellers, dragging will occur at shutoff if the impellers are set properly at the condition point.

Clearances shown in the table below are general guidelines. *These clearances apply to pumps with 50-foot maximum settings.* Refer to the manufacturer's operating instructions for deeper settings.

Closed Impellers

Bowl Size	Impeller Clearance
Through 9″	1/8″
10″ through 14″	1/4″
15″ through 24″	3/8″
25″ through 36″	1/2″
40″ and up	5/8″

Mixed Flow and Semi-Open Impellers

Bowl Size	Impeller Clearance
6″ through 13″	.015—.020″
14″ through 24″	.020—.030″
25″ through 36″	.030—.050″
40″ and up	.050—.075″

Mechanical seals should be adjusted per the manufacturer's instructions after impeller adjustments have been completed.

Propeller Pump Adjustment

1. Use a suitable wrench and raise the shaft by turning the adjusting nut until the propeller breaks free. At this point, the rotating assembly will turn easily, usually by hand.
2. Raise the shaft until the propeller is in the full up position. Measure this distance.
3. Lower the propeller one-half of the measured distance.
4. Turn the adjusting nut to the nearest hole in the motor clutch and install the lock screws.

TROUBLESHOOTING
Trouble indicators and possible causes

Insufficient Pressure

1. Speed too slow (check voltage)
2. Improper impeller trim
3. Impeller loose
4. Impeller plugged
5. Wear rings worn
6. Entrained air in pump
7. Leaking column joints or bowl castings
8. Wrong rotation

Insufficient Capacity

1. Speed too slow
2. Improper impeller trim
3. Impeller loose
4. Impeller or bowl partially plugged
5. Leaking joints
6. Strainer partially clogged
7. Suction valve throttled
8. Low water level
9. Wrong rotation

No Liquid Delivered

1. Pump suction broken (water level below bell inlet)
2. Suction valve closed
3. Impeller plugged
4. Strainer clogged
5. Wrong rotation
6. Shaft broken or unscrewed
7. Impeller loose

Using Too Much Power

1. Speed too high
2. Improper impeller adjustment
3. Improper impeller trim
4. Pump out of alignment or shaft bent
5. Lubricating oil too heavy
6. Pumping sand, silt, or foreign material

Vibration

1. Motor imbalance—electrical
2. Motor bearings not properly seated
3. Motor drive coupling out of balance
4. Misalignment of pump, castings, discharge head, column, or bowls
5. Discharge head misaligned by improper mounting or pipe strain
6. Bent shafting
7. Worn pump bearings
8. Clogged impeller or foreign material in pump
9. Improper impeller adjustment
10. Vortex problems in sump
11. Resonance—system frequency at or near pump speed

Abnormal Noise

1. Motor noise
2. Pump bearings running dry
3. Broken column bearing retainers
4. Broken shaft or shaft enclosing tube
5. Impellers dragging on bowl case
6. Cavitation due to low submergence or operation beyond maximum capacity rating
7. Foreign material in pump